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Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24

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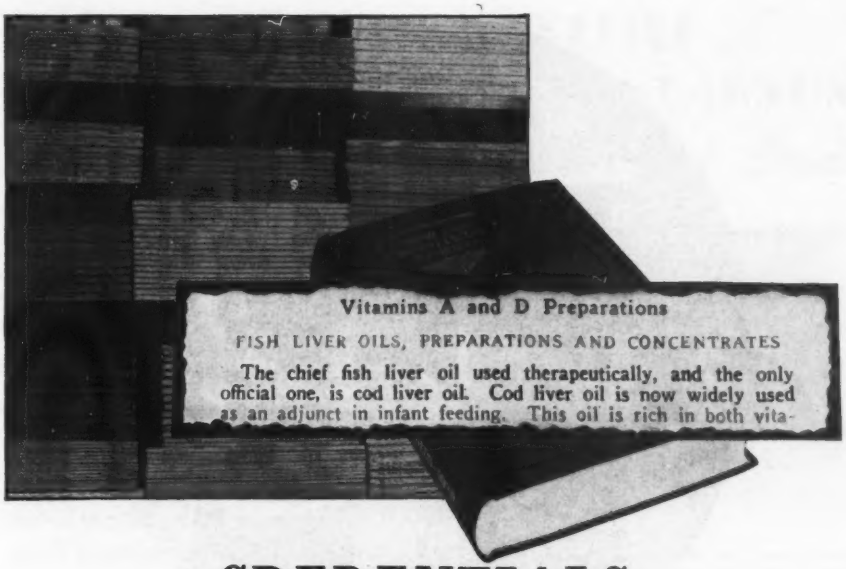
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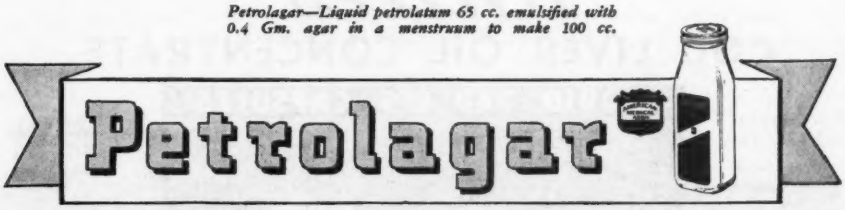

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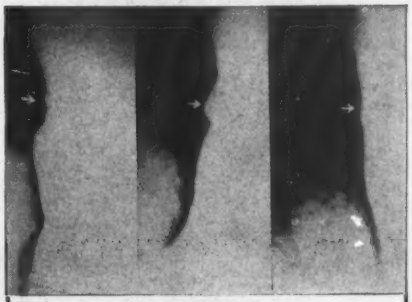

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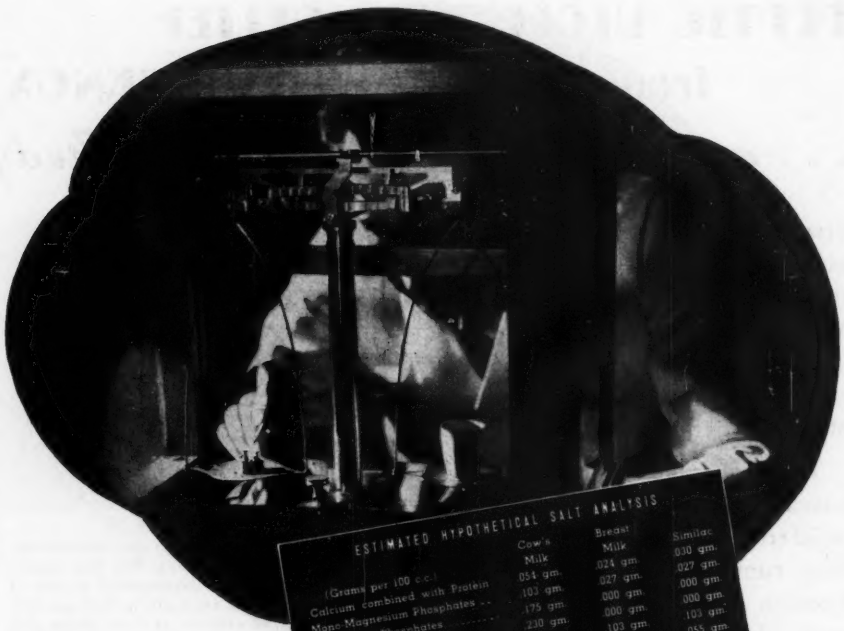

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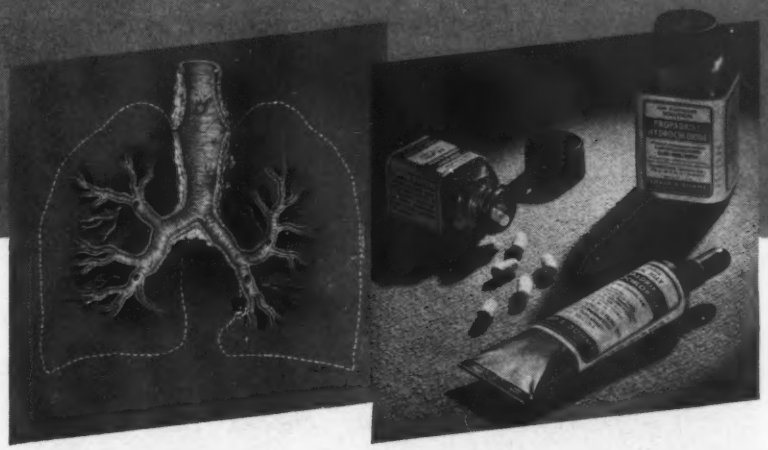

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[1] Levitas, Irving M.: Treatment, Modification and Prevention of Measles by Use of Immune Globulin (Human), J.A.M.A., 1935, *105*, 493.

[2] Laning, G. M. and Horan, T. N.: Immune Globulin Used as a Preventive and Modifier of Measles, Jour. Mich. Med. Soc., 1935, *34*, 772.

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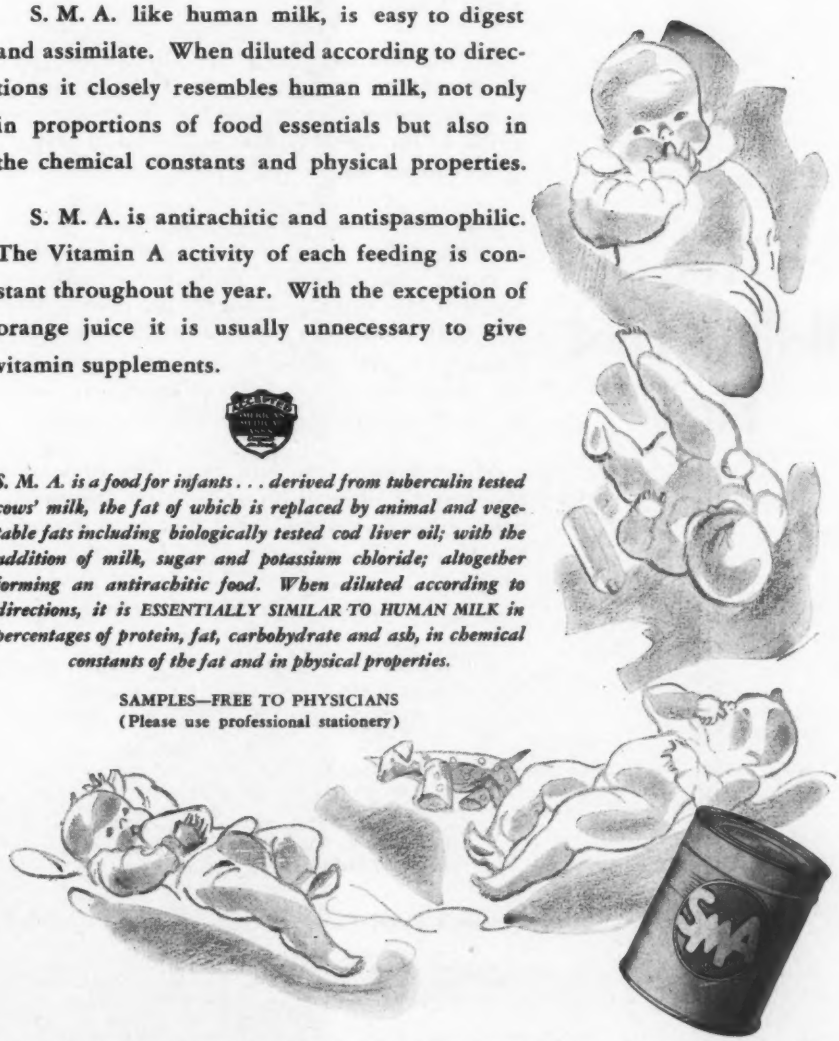

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[1] Sevringhaus, E. L., and Evans, J. S.: *Am. J. Med. Sc.* 178:638, Nov. 1929.

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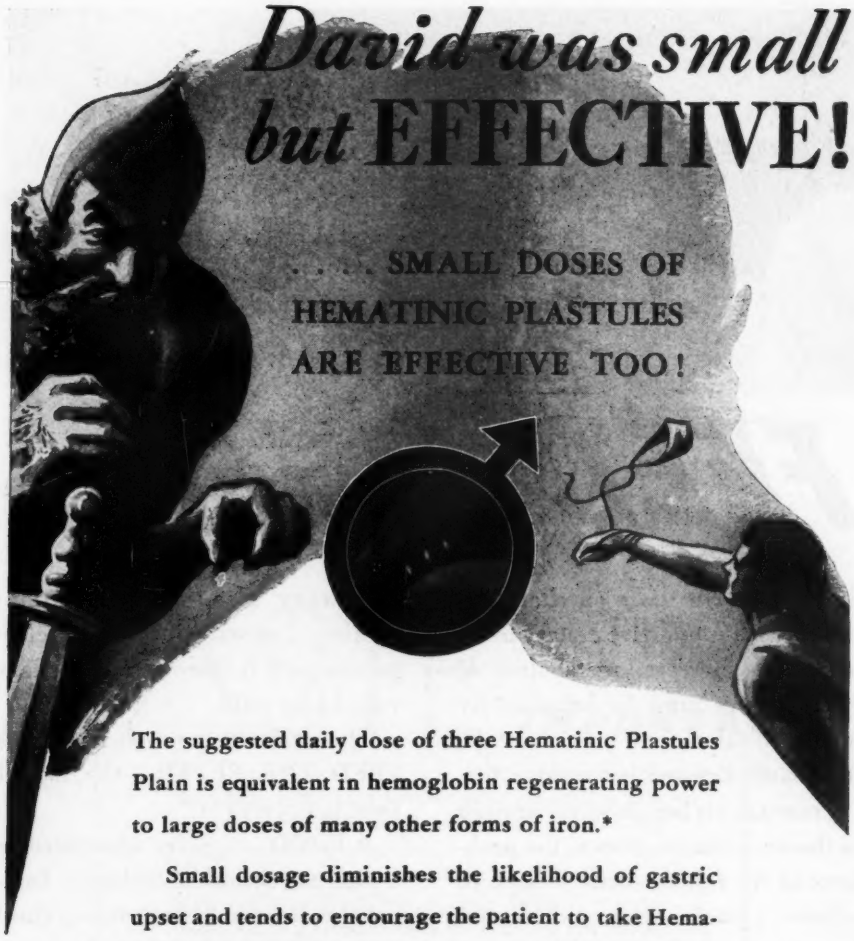

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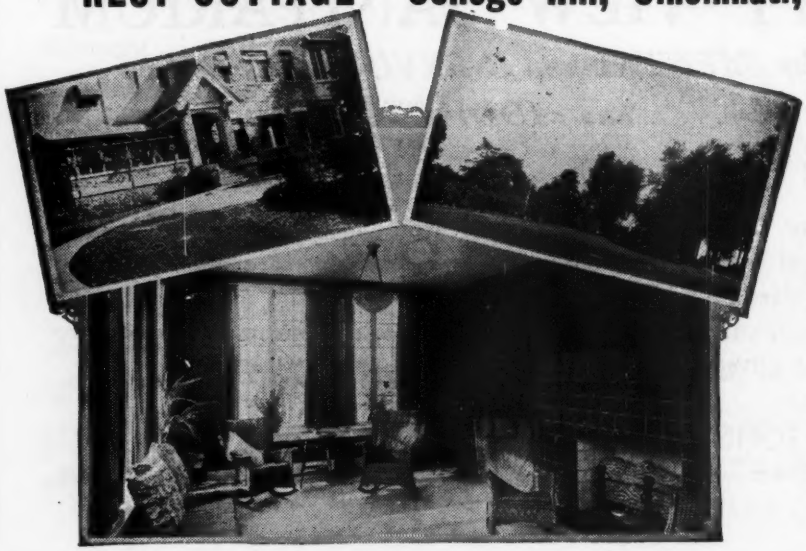

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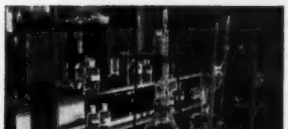

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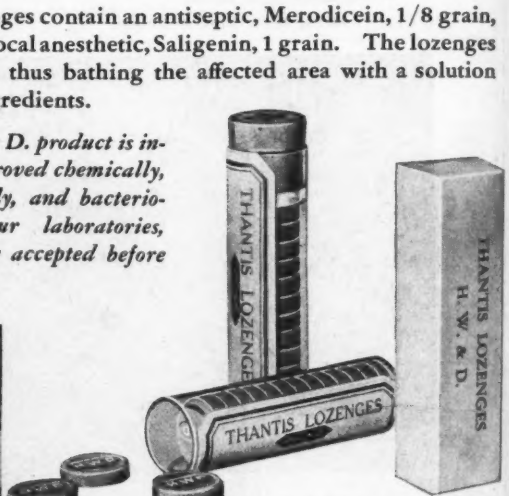

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Volume 32 FEBRUARY 1939 Number 2

FRACTURE AND FRACTURE-DISLOCATION OF THE ASTRAGALUS*

By OSCAR LEE MILLER, M.D.
Charlotte, North Carolina
and
LENOX DIAL BAKER, M.D.†
Durham, North Carolina

The high percentage of poor end results in fractures of the astragalus and the lack of agreement in the methods of treatment have prompted the authors to study the different therapies from an anatomical as well as from a functional viewpoint. The main purposes of this paper are to advocate accurate open reduction in fracture-dislocation of the astragalus; to discuss the rationale of early subastragalar arthrodesis, with disturbed relationships in the calcaneo-astragaloid joint and to counsel against astragalectomy. When the term subastragalar arthrodesis is used in this paper, it is intended to include fusion of the astragaloscaphoid and calcaneocuboid joints if indicated.

In considering the anatomy of the astragalus one should keep in mind that it presents seven articular surfaces and articulates with four bones. It affords no origin or attachment for muscles or tendons, it has no main nutrient artery,[1] and by far the greater portion of its surface is covered by non-vascular articular cartilage, which does not react well to trauma, and which, like all cartilage, has poor healing properties.

The astragalus, frequently referred to as the keystone of the tarsal arch, is so situated that all seven of its articular surfaces are weight-bearing in function and are involved in all motions of the ankle and foot. The subastragalar joints, the surfaces of which lie in three planes, permit inversion and eversion of the foot without sacrifice of bony support and so allow the body to maintain an upright position when uneven surfaces are walked upon. It is the disturbance of the relationships in the subastragalar region that gives us our greatest difficulty in effecting reduction and that causes so much disability following fracture of the astragalus (*Fig. 1*).

The record of textbooks and of other literature[2 22] indicates that injury of the astragalus is comparatively rare, a fact to be explained by its protected position between the malleoli. In a given accident calculated to injure the foot or ankle, the os calcis or the distal end of the tibia or fibia is more likely to receive the insult of fracture than is the astragalus; however, minor and major fractures do occur in this bone, and the treatment of extensive injuries, particularly of the body and articular facets of the astragalus, calls for calculating surgical judgment to prevent serious and permanent impairment of the foot and ankle.

In reviewing the literature of fractures and dislocations of the astragalus one finds many case reports, but no recent large series of cases. Ely,[3] in 1906, reviewed the literature of fractures of the astragalus and called attention to the lack of recognition at the time the fracture occurred. He advocated treatment immediately following the injury and believed that, when the fragments were displaced, their dislocation should be reduced, if necessary, by an open operation. Ely felt that the studies being made at that time pointed the way to a more successful treatment of these injuries. A perusal of the literature since the time of his paper does not indicate that his hopeful views have been entirely justified. Certainly no standard has been set in the method of treatment, the percentage of good end results is hardly improved, and the advancement made in diagnosis is probably a result of the general increase in the use of the x-ray. Cabot and Binney,[4] writing at about the same time, reviewed

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Thirty-Second Annual Meeting, Oklahoma City, Oklahoma, November 15-18, 1938.

†Orthopedic Division of Surgery, Duke University School of Medicine.

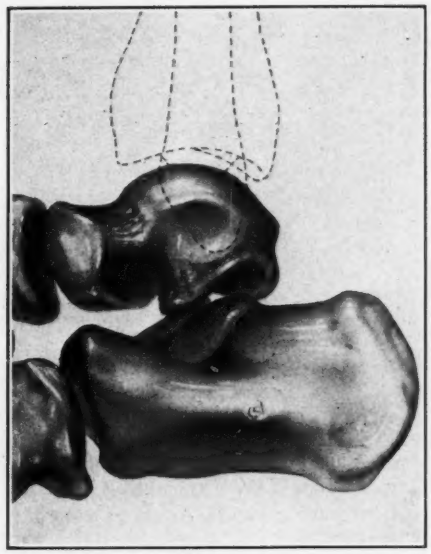

Fig. 1

A lateral view of the tarsal region showing in bold relief the articular surfaces of the astragalus and adjacent bones. It is the disturbance of the congruity of these articulations that gives us our greatest difficulty in effecting reduction and that causes much disability following fracture of the astragalus.

one hundred and eleven cases of fracture of the os calcis and astragalus seen at the Massachusetts Hospital over a period of fifteen years. Thirty-eight of these patients had fractures of the astragalus. Like Ely, Cabot and Binney believed open reduction should be done when necessary, and said:

"Results without operation are uniformly bad. Great limitation is the rule and is not likely to be exceeded by that resulting from operative failure."

They pointed out the difficulty of determining, even from careful study of an excellent series of roentgenograms, the exact details of the fracture. They called attention also to the danger of valgus and varus deformities after fracture of the astragalus, discussed a case, and referred to other similar ones in which

"the amount of motion in the ankle joint was sufficiently good to make it improbable that it could be improved by operation. On the other hand, very great disability resulted from the position of the foot."

In their series of fractures of the astragalus there was an average period of disability of one and one-half years, and the authors say:

"It is very obvious from the results that this fracture gives a result distinctly worse than fracture of the os calcis."

Hasford[5] was able to obtain the records of fifteen cases of fracture of the astragalus which occurred at St. Bartholomew's Hospital during a period of ten years. He describes in detail the mechanism of violence, the signs and symptoms, and the diagnosis. Hasford states that astragalectomy does not give a very good foot. With the exception of two cases, in which only fracture of the posterior process was present, there was not one satisfactory result in his series. He says:

"The degree of disability depends on which joint is involved, whether it is the ankle joint or the subastragalar or both. In fractures of the neck of the astragalus the ankle joint may or may not be involved, but even if it is, provided the fracture is not comminuted, a full range of movement may be obtained. This does not seem, however, to apply to the subastragalar joint, the movements here being limited and sometimes painful. Thus, though the patient has a full range of flexion and extension at the ankle joint, the movements of inversion and eversion are limited and perhaps absent. This condition will manifest itself when the patient is walking on rough ground or on the side of a hill."

It is not attempted in this paper to define the physical forces producing fracture of the astragalus, and we believe no author has yet worked out satisfactorily the true mechanics of the various fractures and dislocations of this bone or explained why exposed, associated bones about the foot and ankle are spared while the more or less protected astragalus is severely damaged. Cotton[6] has described a "shearing" type of fracture as the result of falls from a height in which the ball of the foot receives the force. Other writers[7 8 9 10] have analyzed the mechanism in individual cases and have presented excellent hypothesis. It is not amiss at this time to stress the importance of roentgenograms in all so-called sprained ankles and in all ankle injuries that have been sustained in falls from a height. In the presence of fracture it is wise to make stereoscopic views; one must remember, however, that the roentgenogram cannot be relied upon to give always an accurate picture of the relationship of the fragments (*Fig. 2*).

Chart 1

Methods of Injury	Left	Right	Total
Fall from a height	5	1	6
Turned ankle, walking, etc.	4	5	9
Direct trauma, heavy objects	2	1	3
Automobile accidents	2	8	10
Hyperflexion (posterior process)	0	2	2
	13	17	30

Key and Conwell,[11] in their able treatise on

fractures, dislocations and sprains, divide fractures of the astragalus into (1) fractures of the posterior process, (2) fractures of the body, and (3) fractures of the neck. This is an excellent working classification.

Fracture of the posterior process is rarely a serious injury. No weight-bearing surfaces or articulations are involved. Treatment usually consists of immobilization of the parts in a plaster of paris cast, with the foot in dorsiflexion. Occasionally, as in Hasford's series, it may be necessary to excise the loose fragment. Following injury of this region, there often arises the medico-legal question of whether one is dealing with a fracture of the posterior tip of the astragalus or viewing a normal os trigonium.[12]

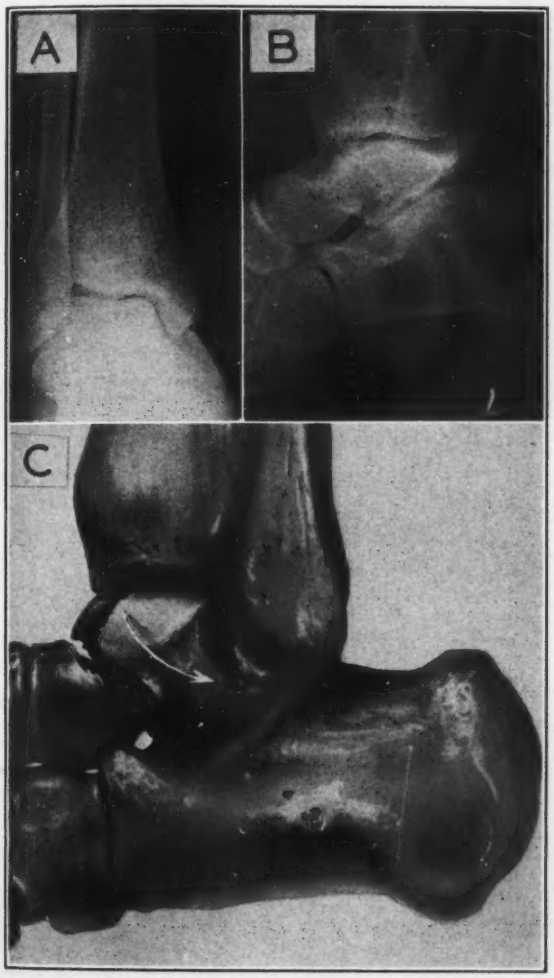

Fig. 2

(A and B) (Case 21) Comminuted fracture of neck and body with subluxation of anterolateral fragments of the body. Marked anatomical distortion not shown by roentgenogram.

(C) (Case 21) Drawing to demonstrate the findings at operation. Arrow indicates direction of subluxation of anterolateral fragments of body. The superior articular surface was facing downward and outward; lateral articular surface was facing forward and inward.

Fractures of the neck of the astragalus occur more frequently than fractures in other parts of the bone. In cases of fracture through the neck without displacement of fragments, a good result usually will be obtained by resting the foot in a well fitted plaster of paris cast until healing occurs. In fractures at the junction of the neck and body, displacement usually occurs, and difficulty is likely to be encountered in obtaining accurate reduction by manipulation. The manner of reduction and after-treatment are carefully outlined by Key and Conwell. We believe it important to secure accurate reduction of these fractures at the base of the neck of the astragalus even if resort to open reduction is necessary. Correct reapposition enhances the blood supply of the fragments and contributes to proper balance in the foot (*Fig. 3*).

Simple crack fractures through the body of the astragalus, as a rule, present no serious surgical problem. Rest of the foot in neutral position in a plaster of paris cast for a few weeks and protection from weight-bearing until consolidation occurs will ordinarily result in a well functioning member; however, extensive and disorganizing fractures of the body of the astragalus with involvement of the articular surfaces and dislocation of the fragments into the soft parts before or behind the ankle call for most deliberate surgery. In some cases of fracture-dislocation the posterior segment of the body may be displaced out beside the Achilles tendon and the anterior segment rotated and thrown anteriorly beneath the skin of the dorsum of the foot. Such fractures may be reduced occasionally by the closed method; however, this is rarely possible, and open reduction is indicated.

All writers on this subject have placed emphasis upon early operation when open reduction is indicated. This, of course, may mean within ten days to

two weeks or as soon as the tissues of the area are reasonably safe for surgery. We are sure that the great majority of cases of displaced fractures of the body of the astragalus call for open reduction. It may be necessary to make an incision both behind and in front of the ankle to deliver the fragments successfully and to replace them accurately. Such was the experience in two of our cases; it was necessary to take the major portion of the body from beneath the skin beside the heel cord and to replace it into the mortise through an anterior incision. This procedure permits accurate reduction, calls for less manipulation and manhandling of the fragments, and is attended by minor damage of the surrounding tissues, which are still suffering from the original trauma. After these operations the incision, or incisions, should be closed without drainage and a light plaster of paris cast applied over an ample dressing.

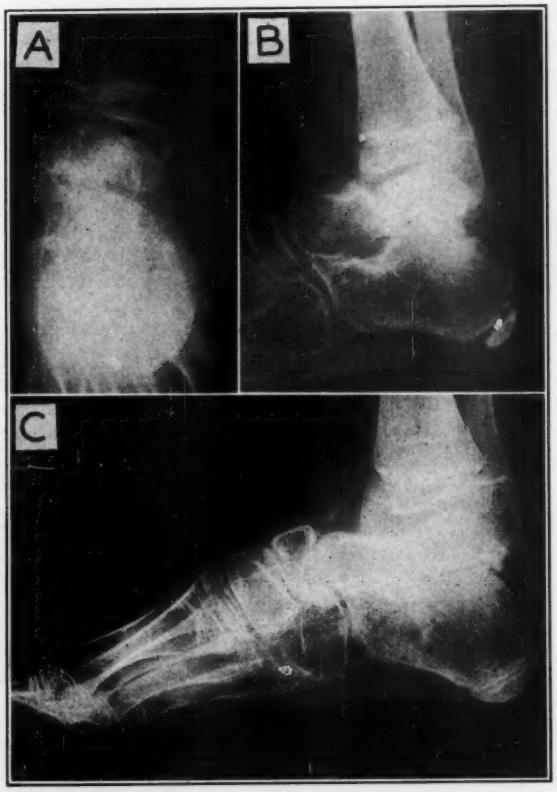

Fig. 3

(A and B) (Case 27) Appearance of astragalus three months after fracture in a child eight years of age. Fracture was manipulated twice in an effort to obtain satisfactory reduction. Note ischemic changes in the posterior fragment. We believe had accurate open reduction been resorted to, much if not all of the deformity and circulatory embarrassment could have been prevented.

(C) (Case 27) Some months after subastragalar arthrodesis, the foot not yet in satisfactory position; however, density of body appears nearer normal and patient walks with much less pain.

Some of our best surgeons in writing on this subject continue to tender astragalectomy as an optional measure in the treatment of fracture-dislocations of the astragalus. In the most recent book on the management of fractures and dislocations, by Wilson and his associates,[13] we find the following passage:

"The amount of displacement in these fractures is generally great and the damage to the soft parts extreme, irrespective of whether the fracture is closed or compound, and the nutrition to the dislocated fragment is often cut off. Any attempt to replace the fragments and to obtain union seems unwise; in the patient in which this was done the result proved totally unsatisfactory. Astragalectomy with backward displacement of the foot is the operation of choice."

On the other hand, Robinson,[14] in 1916, observed:

"Excision of the displaced astragalus, whether in part or whole, in cases of fracture-dislocation of that bone has invariably resulted in a flat, distorted and impaired ankle joint. The keystone of the arch of the joint has been destroyed or its form altered, and the recipient of such an injury is rendered, to a greater or lesser degree, a permanent cripple."

This author reported open reduction in a badly dislocated and fractured astragalus in a patient 48 years of age with a good result. Bohler[15] says:

"If possible the body of the talus should not be removed because this causes severe lasting disability."

Cotton[6] has expressed the opinion that if excision of the astragalus is unavoidable, it is wise surgery to try for tibiotarsal fusion with the alternative of amputation at the site of election.

We appreciate that it is somewhat a temptation to do an astragalectomy when a case of fracture-dislocation of the astragalus is encountered in which the fragments are thrown entirely out of the mortise of the ankle joint. A factor prompting the preparation of this paper was our experience with four cases of astragalectomy after severe fracture. Astragalectomy was done in two cases by the authors (one each), and two

were seen after astragalectomies by other surgeons. The one thing with which we are impressed is the inadvisability of doing an astragalectomy after this injury in an adult. It is difficult (if possible at all) to balance the foot between the malleoli, and, even if placed at the time of operation in apparent balance, the foot is persistently inclined to go into varus deformity and becomes chronically lame and crippled.

In one of the four cases (Miller's) reconstruction operation was carried out, the malleoli being balanced astride the upper surface of the os calcis, the posterior tibial tendon being resected, and the insertion of the anterior tibial tendon being transferred to the center of the tarsus. This procedure gave a perfectly and permanently balanced foot, but it was painful on walking, and two years later the patient demanded an amputation. A second patient who had had an astragalectomy developed the same crippling varus deformity. Fusion of the os calcis to malleoli was carried out, and a painless weight-bearing member resulted (*Fig. 4*). A third case, in which there was a fracture of the neck with posteromedial subluxation of the body, was seen by one of the authors (Baker) following two attempts at closed reduction and following insertion of skeletal traction into the os calcis. When first seen, the skin over the displaced fragment had sloughed and a frank pyarthrosis was present. Because of the infection, an astragalectomy was done. As hoped for, fusion occurred between the tibia, fibula and os calcis. The patient walks with a pivoting gait but has a well aligned, painless weight-bearing foot (*Fig. 5*). The fourth case of astragalectomy now has varus deformity, wears a brace, and is considering either a reconstruction operation and fusion or an amputation. He is a seriously crippled individual.

It might be argued that a properly done astragalectomy would not produce the end results here described. While this may be true (the authors do admit some prejudice against the operation under any circumstances), we believe that astragalectomy is not the operation of choice and that, except in the presence of frank infection, it should not be offered in the treatment of traumatized ankles.

In 1912 Von Stockhum[16] employed subastragalar arthrodesis in the treatment of fractures of the os calcis associated with pain in the astragalocalcaneal joints. He reports good results.

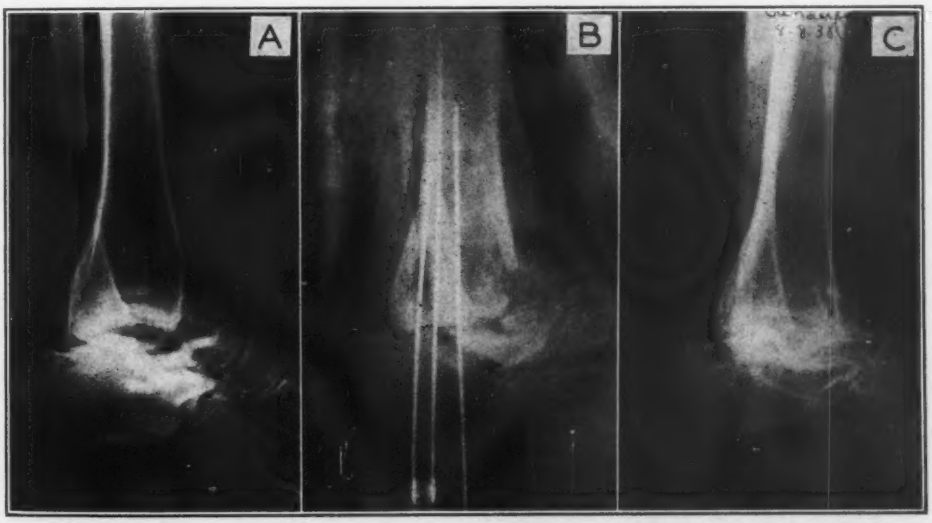

Fig. 4

(A) (Case 25) Laboring man 43 years of age, three years after operation of astragalectomy. Foot in marked varus position and painful on weight-bearing even in a brace.

(B) (Case 25) Immediately after fusion of os calcis to tibia and fibula and balancing of foot. Position controlled by three Kirschner wires.

(C) (Case 25) Fusion of os calcis to malleoli. Foot comfortable in good weight-bearing position. The patient works as a laborer.

Davis[17] has shown that fusion of these joints can produce a stable painless foot. He recognized the great value of this procedure in paralyzed extremities. In 1921 Hoke[18] reported his most excellent procedure for subastragalar arthrodesis that is now generally used as a means of securing painless stability of the foot following poliomyelitis. O'Connor[19] used Hoke's operation in the treatment of traumatic subastragalar arthropathy with good result.

P. D. Wilson[20] reported a series of twenty-six cases of fracture of the os calcis in which subastragalar arthrodesis was carried out. His paper lends encouragement to the treatment of fractures involving the subastragalar joints. Of his twenty-six cases three were too recent for end results to be estimated. Of the remaining twenty-three he was able to ascertain the end result in all but three. Eighteen had returned to work, seventeen at their old jobs and at the same rate of pay as before. The only case that was unsatisfactory failed to obtain fusion at the astragaloscaphoid and the calcaneocuboid joints, the failure being ascribed to faulty technic rather than to a failure of the method itself.

When all, or practically all, of the ligamentous attachments of the astragalus have been torn away, the blood supply is of course seriously disturbed. One must then consider the question of the fate of the astragalus in the light of disturbance of its very limited blood supply and must decide what may or should be done to alter or improve the situation. We can answer this question only from a limited, though we trust practical, clinical experience. In one of our cases of fracture through the junction of the neck and body of the astragalus (in a child of eight) we observed serious alteration of the body due apparently to disturbance of its blood supply (*Fig. 3*). We now think that it was a mistake not to have carried out an accurate open reduction in this case. Later, however, subastragalar arthrodesis was performed. In two other cases of this type of fracture in adults in which both the clinical findings and the roentgenograms indicate satisfactory reduction, there is questionable sclerosis of the posterior fragment. In a case of complete anterior subluxation of the entire astragalus, in which open reduction was necessary, there occurred a gradual necrosis with late secondary infection (at eight months) and finally emergency amputation. Experimental studies of the blood supply of the astragalus have been[1] and are being made,[21] and eventually these investigations may

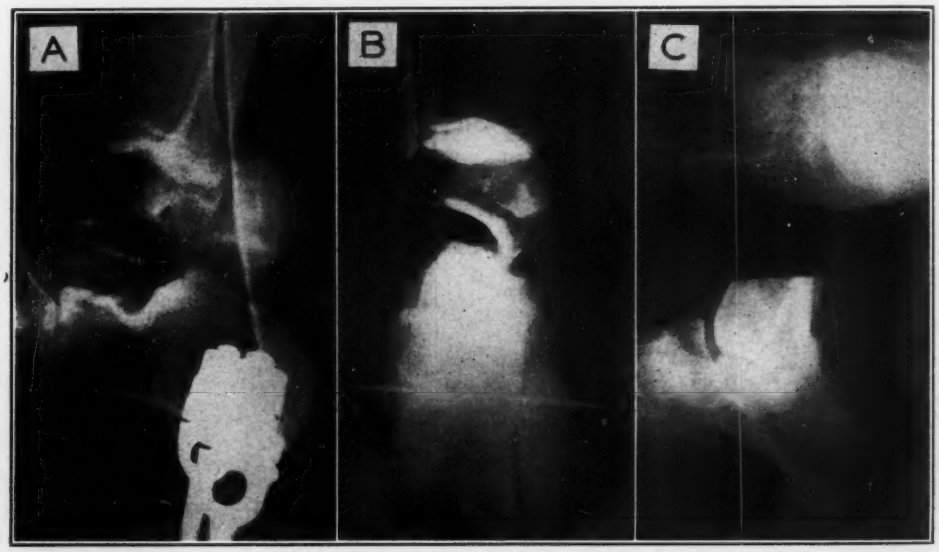

Fig. 5

(A and B) (Case 26) Fracture, junction of neck and body with posterior dislocation of body. Skeletal traction through the os calcis.

(C) (Case 26) Fourteen months after astragalectomy, done because of frank infection. The patient has a pan-fusion with the foot in a good weight-bearing position. The foot is painless and the patient works all day as a farmer.

yield definite recommendations for clinical guidance.

The question arises as to the applicability of subastragalar arthrodesis in the early treatment of fractures of the astragalus as a means both of improving the blood supply of the bone and of eliminating painful articulations.

Conn,[23] in a personal communication regarding fractures of the astragalus, has said:

"Where only the inferior articular surface is involved, I have resorted to an arthrodesis of the subastragalar joint. It is my impression that wherever fracture lines invade this joint, even where the x-ray does not show serious distortion, there is always adequate roughing to produce lasting pain. I have been again and again astonished at the anatomical distortion of the subastragalar articulation surfaces in cases where the x-ray does not show grievous deformity. Possibly I am overradical, but I do not think so, for conservtism in my experience has invited prolonged disability and accomplished nothing. * * * Unfortunately a considerable percentage of my astragalar cases have shown fracture lines on the superior articulating surface, and in these I have fused the tibio-astragalar joint. In the severely crushed, distorted and comminuted lesions of the astragalus, I have resorted to astragalectomy. I do not like the operation."

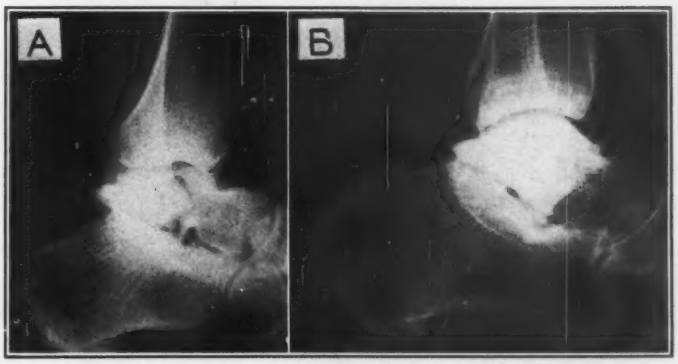

Fig. 6

(A) (Case 30) Comminuted fracture of the body of the astragalus in a patient 54 years of age.

(B) (Case 30) Appearance of astragalus sixteen months after closed reduction with Forrester clamp and traction. The patient doing full day's work on concrete floor as a postal employee.

It seems to us that reduction of the astragalus is the first essential and that, when satisfactory reduction is possible, we should for a while trust to fortune for the re-establishment of nutrition (*Fig. 6*); later, after union has occurred, it should be a matter of surgical judgment as to whether arthrodesing operations are indicated. If they are indicated either in the ankle or subastragalar joints, it will probably be for relief of persistent pain. Conwell and Key feel that one should wait a year before recommending any type of arthrodesis after fracture of the astragalus. We are not sure that it is wise always to wait so long; in some cases a long convalescence may lead to economic havoc, and in all disabling injuries the psychologic factor must be considered. There will hardly be any disagreement with the statement that in weight-bearing joints stability without pain is preferable to any amount of motion with pain. We believe that in proper hands a subastragalar arthrodesis can result in a stable painless foot with sufficient motion for good function. We are

Fig. 7

(Case 21) (Same as Fig. 2) Postoperative films after early subastragalar arthrodesis. In order to get correct apposition of the body fragments, it was necessary to use a vitallium nail. The nail was removed after union took place. Patient doing nicely. Too early for end result.

REPORT OF CASES—Chart 2

No.	Age	Type of Fracture	Date of Injury and Duration	Previous Treatment and Result	Disposition of Case	End Result	Date Last Observed
1	19	Posterior process, right	10/24/37 6 hours	None	Plaster cast neutral position	Painless. Patient does not remember which foot was injured	10/12/38
2	22	Posterior process, right	1929 9 years	None. Pain and swelling following plowing, etc.	Conservative treatment. Heel adjusted	Pain has subsided and patient has resumed work	10/10/38
3	35	Posterior process, right	6/ 1/25 1 month	Ankle strapped	Cast applied	Cured	1/18/38
4	22	Crack in neck, right	12/ 1/28 3 days	None	Strapped	Cured	7/10/37
5	28	Crack in neck, left	1/30/32 1 month	Strapping	Ankle strapped	Cured	6/ 8/37
6	17	Transverse, body without displacement, right	12/ 7/31 20 minutes	None	Plaster cast	Good	9/15/33
7	45	Transverse, body without displacement, left	6/21/38 2 hours	None	Plaster cast	Bad check to doctor and hospital. Unable to contact	7/ 3/34
8	46	Subcortical, head, with lateral dislocation, right	12/20/37 8 days	None	Closed reduction 12/21/38 Skin cast	Seen 6/9/38. No complaint. Unable to contact since	6/ 9/38
9	54	Compression, body, right	1930 8 years	Treated as sprain. Subastragalar motion limited and painful	Conservative regime because of poor operative risk	Subastragalar motion painful and limited. Not treated	7/ 8/38
10	66	Body with compound dislocation of ankle, right	1931 3 years	Bed rest. Foot in varus. 15 degrees motion in ankle. Little, if any, in subastragalar	Shoe adjusted. Paraffin baths. Operation contraindicated	Poor; not treated	9/ 2/38
11	53	Compression, body, left	1908 30 years	Cast. Swelling and pain in the foot following "shopping," etc.	Thomas heels, paraffin baths. No operation; poor risk	Painful foot. Not treated	2/14/38
12	27	Compression, body, left. Soft part injuries	1910 22 years	Cast. Intermittent pain in heel, constant for six years. Never worked regularly	Has an active osteomyelitis of the humerus. No treatment for ankle	Poor. Motion fair in ankle, poor in subastragalar. Foot painful	3/ 4/38
13	60	Compound with dislocation, left	8/25/20 1 day	None	Immediate reduction	Died of gas gangrene 5 days later	8/30/20
14	49	Head with complete anterior dislocation, right	1/ 1/37 10 minutes	None	Open reduction of dislocation, 1/1/37	Ischemic necrosis followed eight months later by infection. Amputation 12/5/37	9/26/38
15	43	Neck with dislocation of body, left	2/27/34 2 years and 10 months	Astragalectomy	Fusion of os calcis to malleoli	Foot comfortable. In good weight-bearing position	11/ 2/38
16	26	Neck with posterior dislocation of body, left	8/27/37 18 hours	Manipulation(2) Skeletal traction. Result: slough over displaced body, pyarthrosis	Astragalectomy and fusion os calcis to malleoli	Pan-fusion. Foot in mild varus, painless. Patient farming	10/ 7/38

REPORT OF CASES—Chart 2 Continued

No.	Age	Type of Fracture	Date of Injury and Duration	Previous Treatment and Result	Disposition of Case	End Result	Date Last Observed
17	28	Neck with dislocation of body, right	9/25/31 2 years	Astragelectomy	Plastic operation and tendon transplant to balance foot and ankle	Walked with increasing pain 3 years and had amputation	9/15/38
18	38	Neck with dislocation of body, left	1/31/34 1 day	None	Astragalectomy (Dr. Miller)	Deformed and painful foot	11/10/37
19	16	Compound, comminuted, right	1930 3 years	Drainage. Pan-fusion, result of infection	Skin graft to ulcerated area	Pan-fusion, poor position. Painless foot	10/20/38
20	23	Neck with dislocation of body, left	10/25/37 1 year	Excision of body. Using crutches at end of 1 year. Foot in equinus and painful	Industrial Commission case. Advised tibiocalcaneal fusion	Painful foot. Unable to bear weight	10/27/37
21	20	Comminuted, neck and body, left	6/ 7/38 7 hours	None	Subastragalar arthrodesis. Reduced fracture of body, held with Vitallium nail. 6/14/38	Too early. Last visit 10 degrees of ankle motion. Nail removed by Dr. W. White on 9/22/38	11/ 2/38
22	40	Body with fracture of scaphoid, left	Dec. 1936 7 months	Strapped, treated as sprain. Painful foot, especially inversion and eversion. Cannot walk on rough ground	Subastragalar arthrodesis, 6/9/38	Patient walking without pain 12 weeks after operation. Too early to ascertain final end result	10/21/38
23	38	Subcortical, lateral aspect with subastragalar dislocation, right	Dec. 1935 5 months	Incomplete reduction. Painful foot. Astragalocalcaneal arthrodesis. Some varus, painful	Advised fusion of astragaloscaphoid and calcaneocuboid joint with lateral wedge osteotomy	Some pain in tarsal joints. Foot swells with use. Poor result	10/ 7/38
24	49	Body with subastragalar dislocation, left	4/ 3/37 1½ hours	Closed reduction. Painful subastragalar region. Reduction not complete	Subastragalar arthrodesis, 6/8/37	Painless weight-bearing foot. In good alignment. Ankle motion good	9/15/38
25	28	Head with astragaloscaphoid and calcaneocuboid subluxation, left	11/12/36 1 year	Closed reduction. Cast for 5 weeks	Astragaloscaphoid and calcaneocuboid fusion, 11/23/37	Painless foot; some inversion. Patient satisfied and refuses further operation	10/20/38
26	58	Neck with comminution of body, right, compound	June 1927 5 years	Alcohol rubs for "rheumatic trouble." Marked pain to lateral motion in foot	Astragalocalcaneal fusion only, because of presence of pus 1932	Improved. Patient satisfied. Some pain when walking on rocky surfaces	10/18/38
27	8	Junction of neck and body, right	8/29/37 1 day	None	Closed reduction attempted twice with poor result. Ischemic changes in body. Later subastragalar arthrodesis	Some deformity and limp. No pain	10/ 1/38
28	24	Fracture, dislocation of body, right	7/16/37 Few hours	None	Attempted closed reduction. Three weeks later, open reduction. Anterior and posterior incisions	Foot comfortable. In good position. Good ankle motion. Working as laborer in ten months	10/14/38
29	38	Neck with dislocation of body, right	6/13/37 7 days	Application of cast. No reduction	Open reduction and accurate replacement	Comfortable weight-bearing foot	10/ 5/38
30	54	Comminuted, body, right	6/13/37 4 days	Cast applied. No reduction	Closed reduction, using traction and clamp	Foot comfortable. Works all day on concrete floor	10/14/38

confident that arthrodesis of the ankle and the subastragalar joints will give a better weight-bearing foot for all practical purposes than astragalectomy. All of us have observed cases of pan-fusion about the ankle and foot following infection with very practical weight-bearing function.

SUMMARY

This paper is based on the authors' experience in the treatment of thirty cases of fracture of the astragalus. Eight of these cases require no emphasis because the articular surfaces were not seriously involved and the displacement of bone tissue was negligible.

Twenty-two of the cases may be classified as complicated fracture-dislocations of the astragalus. Four of these were seen late and because of circulatory or other factors were untreated; all were followed with poor results. One patient with compound fracture-dislocation died of gas gangrene. One patient with complete dislocation of the astragalus had an aseptic necrosis following reduction and later an amputation. We feel that an early subastragalar arthrodesis might have re-established circulation to the astragalus. Four cases were treated by astragalectomy: of these, two have pan-fusion, one operative and the other the result of infection (*Figs. 4-5*). An astragalectomy patient, because of pain later demanded amputation, and the fourth patient is contemplating amputation. A case of compound fracture-dislocation with crushing of the ankle complicated by infection has a pan-fusion with painless weight-bearing. A patient was seen after he had had an excision of the body of the astragalus; he had a painful equinus deformity. Pan-fusion was recommended. Seven cases have had some form of arthrodesis other than pan-fusion. Two are too early to judge but are making satisfactory progress (*Figs. 2-7*). A case because of error in technic and failure to fuse the astragaloscaphoid and calcaneocuboid joints, is in need of further plastic work. The remaining four fusion cases have painless weight-bearing feet with good function. Two patients had open reduction of the fracture, and one patient had a closed reduction; all three obtained a satisfactory result (*Figs. 6-8*). With the exception of one case in which an error of technic was made, good functional results were obtained in all treated cases except the patients who had elective astragalectomies.

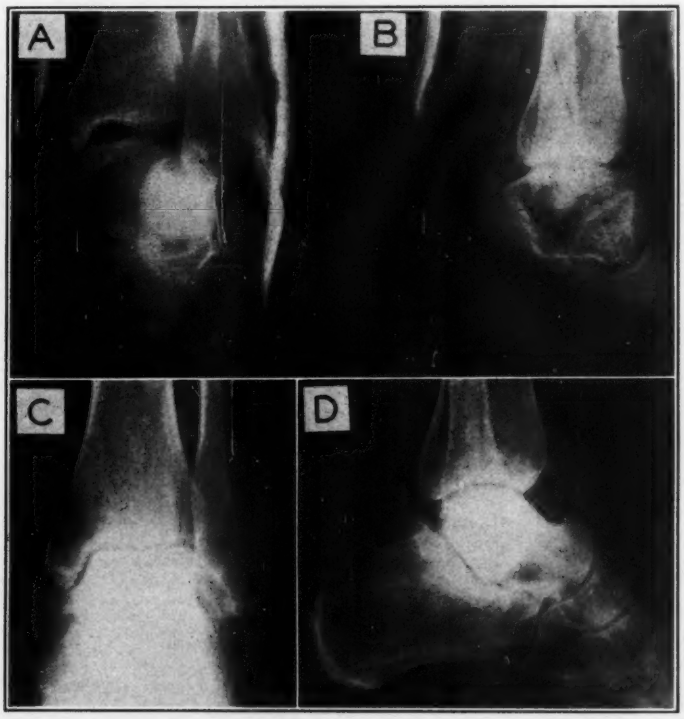

Fig. 8

(A and B) (Case 29) Fracture-dislocation through body with marked rotation and displacement of fragments in a woman 38 years of age.

(C) (Case 29) Appearance of astragalus sixteen months after open reduction. Foot is painless and well balanced.

CONCLUSIONS

(1) Treat simple fractures of the astragalus simply. Stereoscopic roentgenograms are advisable. Appreciate the fact that the subastragalar region is difficult to visualize.

(2) Do early accurate open reduction on frac-

tures of the astragalus when there are displacement of fragments or derangement of the articular surfaces. When entirely satisfactory reduction cannot be obtained, subastragalar arthrodesis should be considered as an early measure. Pan-arthrodesis is sometimes necessary.

(3) After closed or open reductions, do arthrodesing operations if painful joints develop.

(4) Do not do astragalectomies except in the presence of frank infections.

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DISCUSSION (*Abstract*)

Dr. Guy A. Caldwell, New Orleans, La.—Doctors Miller and Baker have made a valuable contribution to our knowledge of the treatment of fractures of the astragalus, particularly of those with serious disturbance of the calcaneo-astragaloid articulation. Having seen and obtained several poor results by treatment of such fractures with astragalectomy, they prefer open reduction and, when necessary, subastragalar arthrodesis soon afterwards.

All of us who have done astragalectomies on adult patients will readily admit that it is much more difficult than when done on children, and that it is more mutilating than subastragalar or pan-arthrodesis. All will probably agree that when astragalectomy is done on an adult, solid fusion of the ankle should be obtained with backward displacement of the foot. If primary astragalectomy is done with proper attention to details, it is evident from the writer's own cases that a good weight-bearing extremity may be obtained in some instances.

Graham and Faulkner, of Richmond, Virginia, in 1929 reported ten patients with fractures of the astragalus on whom astragalectomies were performed, and 70 per cent of them had good results. Most of their cases were not operated upon, however, until several months or years after injury. Wilson and his associates, whose article has been referred to by the essayist, reported two good and one fair result in the three cases of astragalectomy which they were able to follow. They had one poor result from an open reduction and, therefore, had good reason to recommend astragalectomy.

Key and Conwell would reserve removal of the astragalus for the septic cases following compound fractures, and since under these conditions the fragments are destined to become sequestra and can only serve to block drainage, when they are left in place there can be no reasonable argument against this procedure.

We have observed and treated only three fractures of the body of the astragalus in recent years. In one case, astragalectomy was done two years after his injury. Although the result is not known, I suspect that the deformity was improved, but the function continued to be poor.

The other two cases have been on the fracture service of the Charity Hospital of New Orleans during recent months. One was a simple, comminuted fracture of the astragalus with marked impaction and displacement. Efforts to do a closed reduction failed and traction and countertraction, using Steinman pins through the tibia, os calcis and metatarsals likewise failed. While waiting for the pin holes to heal before doing an astragalectomy the patient deserted, but fell into the hands of one of the staff members. Conservative measures have been continued, but the patient has pain and swelling and disability of the ankle, and ultimately further operative measures will be required. In this case with comminuted body and greatly displaced fragments, it is difficult to see how open reduction or early arthrodesis could have been employed.

The last case was admitted a few hours after an automobile accident. He had a compound, comminuted fracture dislocation of the astragalus and malleoli with extensive laceration of skin, tendons, vessels and nerves. In addition there were fractures of both femurs. One of my associates did a careful debridement and suture of the wound and placed the foot and leg in plaster with a window. Extensive phlegmon developed rapidly, the plaster was removed and all stitches taken out. Multiple incisions were followed by rapid improvement, but sloughing about the ankle was so extensive that amputation was necessary after four weeks. In this case it would seem possible that primary astragalectomy with wide open drainage might have prevented the serious phlegmon that resulted later in amputation.

Our observations would incline us to differ somewhat

with Dr. Baker's conclusion that we should not do astragalectomies. We agree that there is place for open reduction and for subastragalar arthrodesis in the treatment of certain simple fractures of the body and neck of astragalus. It seems equally certain, however, that in the worst comminuted cases and in severe compound fractures of the body astragalectomy is the logical, and sometimes the only, procedure possible. We would prefer to substitute for Dr. Miller's dictum the advice given by Wilson and his associates under the heading of "General Principles of Treatment," referring to fractures of the tarsal bones. "In injuries involving the astragalus the removal of this bone may be necessary, but its replacement is always preferable when possible, even if this necessitates operative fusion of one of its joint surfaces. When astragalectomy is necessary, the well-established principles governing this operation should be observed, including backward displacement of the foot."

Dr. Baker (closing).—In condemning astragalectomies, we had in mind the type of procedure where an effort is made at maintaining motion between the ankle mortise and the calcaneus. We recognize the fact and have stated that in some injuries, particularly where infection is present, an astragalectomy is essential. However, when astragalectomy is necessary, we believe the end result to be hoped for should be a fusion between the tibia, fibula and calcaneus. We all know that panfusion will give better alignment to the foot, will result in less shortening of the extremity and will give a better functional and cosmetic result than can be hoped for in astragalectomy.

We do not think an astragalectomy should be used when any other procedure is feasible.

THE MANAGEMENT OF COMPOUND INJURIES OF THE FACE AND JAWS*

By James Barrett Bbown, M.D., F.A.C.S.
St. Louis, Missouri

The term, "compound injury of the face," may be used to designate any serious facial injury. Besides fractures, the complications may include tearing into the mouth, nose or conjunctiva, displacement of the eyeball, paralysis of the seventh nerve, occlusion of the nasal airway, damage of the parotid duct, and involvement of the nasal sinuses. Any accident may produce this type of injury, but the frequency of automobile accidents has offered a chance for a rather loose classification, by some observers, of the types of injuries to expect.

When passengers are not even momentarily aware of an impending crash, they do not set themselves for any bracing effect of their own, and the worst injuries may occur, including cranial and cervical spine fractures. The lesions may be as bizarre as those of firearm injuries, and, occasionally, of some importance in determining the extent of the injuries is the knowledge of the damage the car has undergone. Another source of bad facial tears and fractures are door handles that catch persons outside the car.

Neurologic Findings.—If the patient has been unconscious, there has been some brain damage, and a neurologic examination, including x-rays, should be made. Also, in most severe cases, x-rays should be taken of the cervical spine, as fractures are frequently sustained here from the snap blows the head may receive and even if no symptoms develop, a small, unrecognized fracture may be an important medicolegal point. Furthermore, aside from making the patient as comfortable as possible, no extensive facial repair should be attempted until the cerebral condition permits it. The manipulation in taking facial x-rays is difficult and may be dangerous if there is a cervical spine fracture.

Glass Investigation.—Shatterproof glass offers a resistance that may produce markedly comminuted fractures with little laceration of the surface, but often with widespread avulsion of the scalp. If it does break, the most clean-cut actual chiseling of soft parts, cartilage and bone may occur, and, when once broken entirely through, it leaves many chips that may get in wounds. The search for this foreign body may be simplified by determination of whether or not any glass has been completely broken. Information about the rear vision mirror should also be obtained as it frequently is the sole cause of injury.

Diagnosis and Recording of Extent of Injuries.—In extensive injuries, it may be best to wait until the patient is in the operating room before manipulating the tissues simply to find out the extent of damage. There should be determination and recording of the loss, or tearing of all the features, the extent of detachment of bones and then, in regard to the preservation of function, any occlusion of the airway, loss of vision, or facial paralysis should be definitely determined. For example, if there is blindness, or paralysis of the seventh nerve that is not recognized until after operation, there might be some question as to the actual cause of the loss of function. This determination leaves the patient in one of two groups, namely:

(1) With loss of tissue (as from a gunshot wound);

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*From the Department of Surgery, Washington University School of Medicine, St. Louis, Missouri.

(2) Without loss of tissue, but with wide laceration and fracturing.

Dirt and Foreign Bodies in Wounds.—It may help to know the type of dirt or street into which the patient has been thrown. If there is oil in the wound, some may be left behind in spite of the most careful debridement. In explosions such as from dynamite, small bits of clay or clothing are apt to be blown into the body, and these pieces should be removed.

Antitetanus and Gas Gangrene Serum.—If the patient has been hurt in, or thrown into the street, antitetanus serum should be given; if there is evidence that some dirty foreign bodies have penetrated deeply or that some may not be found, then anti-gas gangrene serum also should be given. If the patient has been hurt inside of a car and not thrown out, then the serums are not so important.

X-rays.—For the lower jaw, x-ray diagnosis should be relied upon in all questionable cases. Complete views of both sides, including both condyles and the symphysis, should always be taken, because one or more fractures may be missed on physical examination.

In the upper jaw, demonstrating the regions of the maxillary bones and locating fractures may be very difficult. Good ideas may be obtained of the position of the heavier ridges of bone, such as the orbital borders, frontal processes of the maxilla and the whole zygomatic arch; and, since these are the main guides for the restoration of contour, attention should be centered on them and an adequate number of views taken.

X-rays of the skull and cervical spine should be taken on indication as outlined previously.

The laminograph as developed by Dr. Sherwood Moore has been found of great help in the investigation of the mandibular articulation.

When to Do the Primary Repair.—It is thought that these wounds and fractures should be cared for in the first twelve to twenty hours if possible, before swelling, organization of clots and infection have occurred (*Figs. 1* and *2*). If the patient is seen later than twenty hours and there will be the necessity of manipulation through heavy contaminated clots, then the replacement of bone fragments may be delayed, although the soft parts may still be approximated. Manipulation of badly contaminated upper jaw and nasal fractures is especially contraindicated because the comminuted fragments may be so small and thin and are so subject to infection that large amounts of them may be lost.

Delay in treatment is to be made, as has already been mentioned, if there is neurologic damage that necessitates care or complete rest; if the general condition is such as to require transfusion or other relief of shock; and, if the patient is intoxicated, no jaw-to-jaw fixation should be done until the patient is recovering, and he is not apt to vomit. (It is recognized that the statement has been repeatedly made that in facial fractures one should wait for the swelling and immediate reaction to subside.)

CONSIDERATION OF THE OPERATIVE PROCEDURES

Anesthesia can be of a basal type, or local or nerve block, such as deep injection of the branches of the fifth nerve. It is often evident that the edges of large wounds may be insensitive and sutures may be placed without pain. General anesthesia is to be avoided if possible, but is often necessary, especially in children.

Cleaning of wounds is the next, and perhaps the most important consideration, and may include saline irrigations, soap and water, ether as a solvent if necessary, the removal of hair,

Fig. 1

(A) Complete separation of soft tissue, bone and cartilage extending far back in ethmoid region. This is in effect an actual chiseling open of the face with displacement of the inner canthus.

(B) Complete healing and function gained in one operation which included normal replacement of the bones and inner canthus region. Careful suture of the inside and outside, and careful intranasal drainage of the ethmoid region. Main reasons for good result are early (first hour) operation, fine firm suturing and pressure dressing.

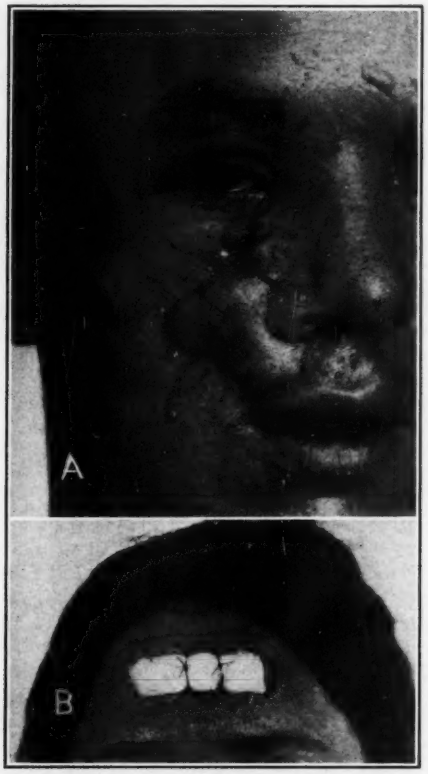

Fig. 2

(A) Result of (1) trap door flap contracture, (2) hemorrhage, (3) infection, and (4) wide sutures. This type of heavy dense scarring in such a soft tissue as the cheek may never be fully corrected.

(B) Method of tying wide sutures over gauze to bind the wound firmly together and to avoid suture marks.

bits of clothing, all possible foreign bodies and detached chips of bone, and finally, the application of antiseptics. If the wound is cleaned quickly after the accident, then no antiseptic can help much, but if one is preferred, one of the mild, stainless solutions may be used. If iodine or other irritants are used, care should be taken of the conjunctiva and nasal mucous membrane, and this type of application can usually be limited to small, contaminated puncture wounds, especially those resulting from bites. The decision of when to clean and when to give the anesthetic is somewhat difficult. but a simple rule could be to clean as far as possible with the patient enduring it and then get in local anesthetic through the wound itself or by deep block, or go ahead with general anesthesia if it is necessary and safe to do so. Oil ground into widespread abrasions is difficult to remove and may require scrubbing with a brush and the use of solvents. Powder marks are almost impossible to remove completely and usually have to be actually cut out, although this often seems trivial compared to the other work necessary.

Debridement.—This meticulous cleaning should almost entirely constitute the debridement of a face; although the usual idea includes excision of edges and all loose torn tissue. This should be practiced carefully in the face, so that parts of features will not be sacrificed needlessly.

Bone Replacement.—The next step is directed toward the replacement and fixation of bone. If the lower jaw is in two, with the covering torn off, then direct fixation through the open wound, by drilling and fastening the fragments together, may give the quickest comfort to the

Fig. 3

(A) Result of rotation of flaps in the ala at original closure.

(B) Result of opening flaps and putting them in their normal relationship. This is important from the standpoint of recognition of whether or not there has been actual tissue loss.

patient. External dependent drainage should be considered in all patients (*Fig. 6*). If the nasal airway is occluded, it can be re-established by carefully introducing a long speculum and dilating it and then slipping through the meatus on each side a good-sized rubber tube; other bone replacements should then be done, such as elevation of orbits and the nose. The same conservation of bone should be practiced as for the soft parts. It is probably better to leave in some fragments that may die than to throw away large sections of bone that might live.

If the sinuses are involved, infection is more likely if they are already infected; the antra are easily drained through their fracture lines in the buccal fornix and, if the frontals and ethmoids are open, they can be left with fairly large rubber tubes carried down into the nose. (These should not be irrigated later.) Usually simple wires, either directly in the bone or from jaw to jaw, or from side to side of the nose will suffice. Dental splints to elevate the upper jaws or to hold noses forward, overhead traction with plaster caps, and skeletal traction may be

Fig. 4

(A) Depression of orbital border by separation of zygoma from the frontal, maxillary and zygomatic process. In this instance, the bone had been displaced so long that its replacement was not attempted, but the globe was elevated by a costal cartilage implant under it. This maneuver usually does not affect binocular vision, but does restore the eye to a normal level.

(B) Result of loss of tissue from eyelid and of crushing in of frontal bone, after several years.

(C) Result of putting more tissue in lid from forehead, filling in depression with free fascia and correcting ptosis of lid by a fascial loop from the frontalis muscle to the tarsus.

occasionally necessary, but one premise of the work outlined here is to omit complicated splints and apparatus if possible.

Suture of Soft Parts.—For suturing the soft parts, new cleaning can be done and fresh instruments used if the mouth secretions can now be avoided. In complicated tears, a design for closure may be difficult to figure, but a start should be made from a known point such as a lip or nostril border; if this cannot be determined, then a start can be made in the center of a wound and the remaining segments bisected with each suture until closure is obtained. If there are flaps torn loose, it is necessary to put them in their proper places to avoid late deformity, especially about the lids, nose and mouth (*Figs. 3* and *4*). No attempt should be made to improve the patient's natural appearance, either in the bone or soft tissue closure.

Surface key sutures may be used for the known points, and these may have to be deep, but they should never be wide (*Fig. 2*). Between these, deep fine silk sutures may be placed so that the wound edges are closed before any other skin sutures are inserted. These wounds are apt to be tears and avulsions rather than cuts, and the epithelium may be lost along the edges, which may be very ragged. If these un-

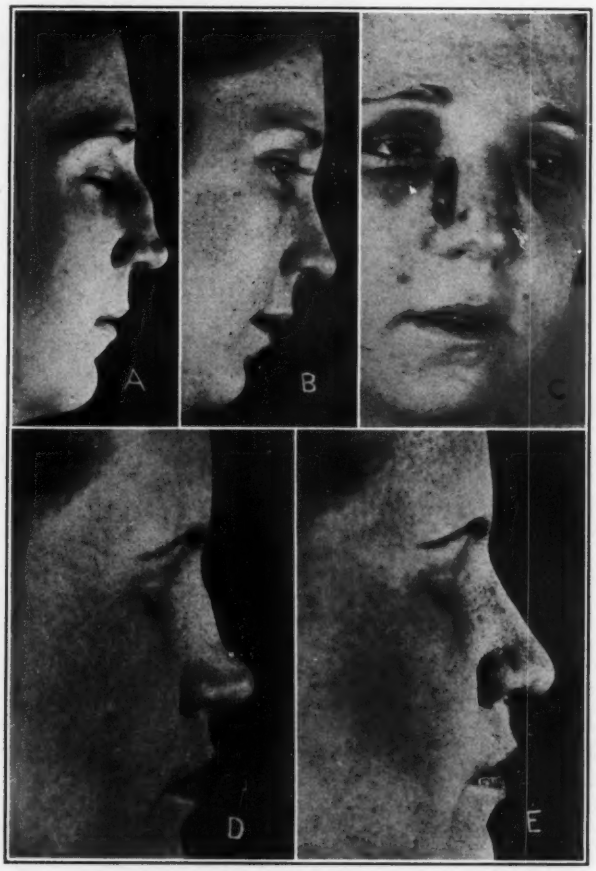

Fig. 5

(A, B, C) Old depression of nose corrected by dissecting free all available tissue, bringing it forward and holding it with through-and-through wire supports for three weeks.

(D, E) Old depression with loss of tissue, which necessitated a cartilage transplant for correction.

even edges are carefully replaced the result may be better than a straight line, mainly because no tissue has been sacrificed. Obviously, ragged tissue with no blood supply, of course, should be cleanly removed. Stay sutures should be put in from the inside if possible, but never made wide on the outside, unless they are left long and tied after the wound is closed over a gauze pad. The deep sutures can be of fine silk, even in dirty wounds.

Trap Door Flaps.—Large or small trap door flaps often give bad final scars because of the tendency for the circular base to contract, and they should, therefore, be closed as carefully as any other wound with especial provision to prevent blood clots under them (*Figs. 2* and *3*). If the flap retracts and its bed enlarges, then the bed of the flap can be reduced in size with deep sutures from side to side before stretching the flap out to fill the defect.

Drains and Dressings.—Small drains are used at suitable dependent areas if the necessity is at all apparent. Careful dressings, using marine sponges of mechanic's waste for pressure to con-

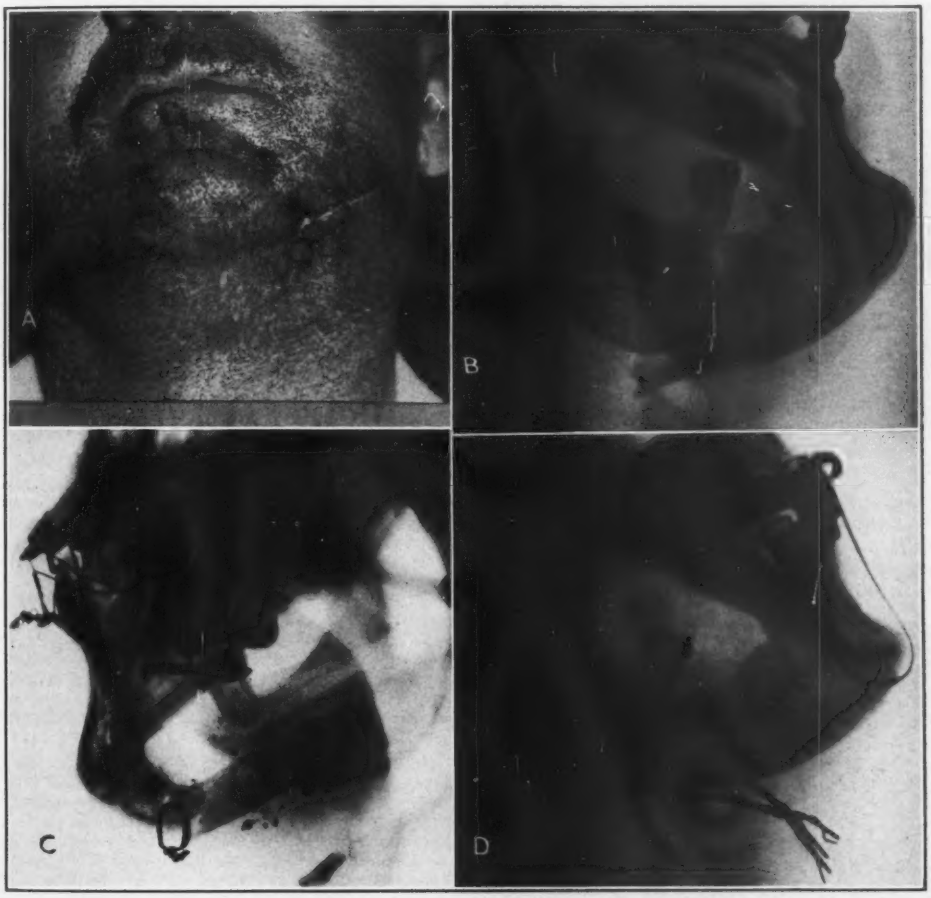

Fig. 6

(A, B) Compound fracture of jaw with complete suture (done elsewhere) of the wound from the mouth without fixation of the bone fragments.

(D) Method of wiring with circumferential and interdental wires after opening of the original wound.

(C) Method of employing a free bone graft (rib) to bridge a gap seven years after the accident. The graft is wired firmly in place to act as its own splint and the teeth are wired firmly for further support. Nearly all such wires of direct bone fixation have to be removed later.

trol hemorrhage and swelling, and thereby infection, are extremely important. The patient is usually most comfortable with a large, firmly supporting bandage.

Qualifications of Treatment.—A detailed account of the care of all the fractures and other complications cannot be included here, but in the individual patient all parts have to be considered and it is not possible to consider bone or soft tissues repair entirely alone. A few further noteworthy subjects are as follows:

Where wide areas of soft tissue have been lost, as good a closure as possible should be made, with an accurate notation of the estimated loss for future reference in repair. If necessary, simple closure of skin to mucosa can be done.

Bony union need never be expected in the upper jaw, mainly because of the thin plates of bone here which simply cannot bridge across, but fibrous union usually suffices for steadiness. In the lower jaw, the fracture line may persist on x-ray, even though there is solid functioning union with visible cortical bone evident on surgical exploration. The reason for this lack of calcium deposit is not definitely known, but may be due to long-continued infection. This is an important medicolegal point.

If orbital borders are left down too long there may be such derangement of the ocular muscles that binocular vision may never be attained, even though the globe is raised.

Widening of the bridge of the nose may indicate fractures about the orbits that displace the inner canthus and special effort should be made to get this bony area back in place as early as possible. It is usually best accomplished by through and through silver wire sutures on each side of the nose put through the lateral fracture lines and tied over lead plates.

Late lip scars often become so hard that it may be thought that a foreign body has been left; this is apparently due to the glands that are present, and is occasionally relieved by radiation.

Wide suturing, infection, misplacement of flaps and keloid formation account for most deformities, but secondary repairs are necessary in almost all extensive injuries, and this possibility should always be considered from the start with the patient or some responsible relative (*Figs. 3, 4, 5*).

DISCUSSION (*Abstract*)

Dr. Earl C. Padgett, Kansas City, Mo.—The figures in the United States in 1937 showed 39,500 lives lost, 1,360,000 individuals injured with an economic loss estimated at $1,700,000,000 as the result of automobile accidents. The importance of this type of injury insofar as the face, mouth and jaws are concerned can hardly be overestimated. It is to be remembered also that accidents of a nature somewhat similar may be caused by many other instruments than the automobile.

I have no issue to take with Dr. Brown on any point he has made. I shall occupy my time therefore in elaborating somewhat on a point or two which he had insufficient time to stress completely.

First, I might point out that as a rule the diagnosis of these injuries is not difficult, as one can examine the face and jaw bones either visually or by palpation in practically all parts. This applies especially to the bones. If one palpates carefully almost the total area can be felt accurately.

Insofar as the early care of injuries of the soft tissues is concerned, one can summarize the rules briefly by stating that the soft tissues should be coapted in all layers accurately without leaving any dead spaces. The skin, I believe, should be pared just sufficiently to get a clean-cut edge which can be coapted at right angles. Although one should not sacrifice any essential flaps, one can with advantage pare the skin edges with care and cause a better scar. All perforating wounds of the cheek and lips should be internally approximated accurately. As a rule, all through-and-through perforations into the floor of the mouth should be given some sort of drainage. "Trap door" flaps are difficult to handle, but if one handles them by carefully paring the skin edges of the flap and the base so that the skin edges can be coapted at right angles when the sutures are placed, as good a scar will result as it is possible to obtain. The base can be narrowed slightly by buried sutures. The tension placed on the flap because of a wider base may aid in preventing elevation of the flap later. After resuturing, some type of pressure dressing should be applied for a week or ten days. Continued pressure tends to lessen the tendency to puckering.

Insofar as bony injuries are concerned, one should attempt early replacement of all bones with possibly one exception (the superior maxilla) if general contraindications are not present. This includes the nasal bridge, the infra-orbital and supra-orbital rims, the malar bones and the mandible. In fractures of the maxilla I believe it is very often better to wait a period of a week or so until the nasal airway has become unobstructed. Then when one replaces the maxilla, the patient can breathe without difficulty. In fractures of the upper jaw one should beware of a fracture of the cribriform plate and base of the skull. In such cases early replacement is contraindicated because of the danger of meningitis.

In the treatment of fractures of the upper jaw we have resorted to the reversal of the old principle insofar as the lower jaw is concerned of using the upper jaw as a splint in fractures of the body when the teeth are present. The reversal of the principle should allow one to use the lower jaw as a splint for the upper jaw. This principle has many applications. It is a simple one which any surgeon can use. I believe that this method often is superior to the use of dental splints. These may not hold the upper teeth in exactly the proper relationship to the lower jaw teeth so that the occlusion may not be entirely correct when the splints are removed. In certain cases interdental splints may be necessary, but we have not in our cases as yet found

it necessary. In case of an adult man after wiring the upper to the lower teeth a head gear made from a felt hat crown with a cup underneath the chin with elastic bands in between may be used. Sometimes if the rubber bands are pulled rather tightly the head gear may be uncomfortable. In the case of children or women this simple head gear may be too uncomfortable. On them I have placed a head cast with a heavy wire running forward at right angles to the forehead. A second wire can be run downward and through a perforation in the mental part of the mandible which will definitely draw the lower jaw into position. If nasal or malar bones will not maintain their position after forward packing, fine wires can be placed through the nasal bones or about the malar bone to hold them forward in proper relationship to the face and upper jaw.

In a bilateral mental fracture of the mandible we have sometimes used circumferential wires about the displaced fragments and also circumferential wires over the maxilla by making a hole in the anterior palate with a drill and carrying the wire up out through the nasal fossa beneath the skin of the floor of the nose and beneath the upper lip over the anterior maxillary bone. This is a very good way of holding the loosened fragments in place when interdental wiring of the teeth may not be sufficient.

A fracture at the angle is sometimes difficult to hold in place if it is behind the third molar or if the third molar is absent. A good way to handle this type of fracture is to make a slight incision posterior to the ramus and place a wire through the posterior edge of the ramus. This may be used for traction backward when attached to a heavy wire placed in the head cap in the region of the mastoid process. Usually this is superior to wiring the two fragments together at the line of fracture, as no secondary operation is required because of foreign body reaction or the wire which tends to cause sequestration at the line of fracture.

In condylar fracture some forward displacement does not mean that function will not be good. Usually one should reserve any operative approach to the condyle for a later time when it can be determined how much functional disability is present.

Dr. William Pat Fite, Muskogee, Okla.—The preceding speaker is a well-trained plastic surgeon with wide experience and an interest in general surgery, whereas the speaker, on the contrary, is a general surgeon with an interest in plastic surgery. The facial injuries that come to my attention are derived from two distinct and different sources. The first is from a general surgical practice in a moderate sized community in which all types of automobile injuries are seen. The second is from the type of injury seen in one of the large general Veterans' Bureau hospitals.

I have noted that probably the most frequent types of injuries seen are lacerations of the face. These may or may not be associated with injuries of the bones of the face or skull. When seen immediately following an injury, before edema has taken place, it is relatively easy, in the majority of cases, to ascertain the extent of the bone injury from palpation alone, and it is often unnecessary to take x-rays except as a check-up procedure, as the bony prominences can be seen or felt with the fingers and replaced immediately unless the condition of the patient precludes such maneuvers.

It is to be noted that the average automobile injury occurs, not in the city, but on the highways, and of necessity must be seen by the rank and file of the medical profession. Consequently, it is of much importance that such discussions as this should come before a session of general surgery, or probably better, a general session of both surgeons and medical men.

Attention should be drawn to the fact that in many injuries too much bone is removed that might be saved by conservative measures. It is seldom necessary to remove large pieces of bone of the frontal region or of the face, as these will almost invariably unite, as most of the fractures are not separated from the periosteum. Simple drainage will often control or prevent inflammation. Attention should be called to the fact that, not often, but occasionally, fractures of the base of the nose may involve the base of the skull and result in a fatal meningitis. This we have seen in several cases, and in such instances the family's attention should be called to this possibility.

In fractures of the mandible, when teeth are present, compounding within the mouth is usual. When teeth are absent I have noted that compounding is much less frequent within the mouth. The presence of teeth greatly simplifies the treatment of fractures of the mandible, as the teeth can be wired together and held in occlusion. The problem is more difficult when teeth are absent. I have resorted to wiring in such cases, both in the compound and in the simple fracture. When wiring compound fractures of the jaw the ends of the wire are brought out through the mucous membranes or the skin of the face until union is solid enough for removal of the wires.

The average case seen in the Veterans' Bureau Hospital is late. These are usually seen several weeks or months following the injury. The patients come largely from small towns and rural areas. The lacerations have usually been taken care of fairly satisfactorily as far as closure of the wound is concerned. Many cases have deep stitch marks because they have not been sutured by the proper method to prevent scarring. It is important that the wounds be sutured properly according to plastic methods, and that the sutures be removed early to limit the possibility of stitch marks. Attention to these details is particularly necessary in limiting scarring of the face.

The worst results that we see from injuries about the face and forehead are largely on account of defects resulting from the removal of too much bone at the time of the injury, or failure to recognize and correct a depressed fracture. This type of defect can be fairly well repaired if on the forehead by bone transplants, but deformities about the nose, the malar bone, the zygoma and the mandible are much more difficult. We have seen no extensive osteomyelitis of the skull resulting from compound fractures.

We see relatively few badly deformed noses as the results of past fractures. Evidently the average medical man knows fairly well how to take care of the nasal fracture. The chief defects we see about the face are about the orbit, the zygoma, the malar bone, and the lower jaw. Dr. Brown drew attention to the fact that often fractures of the depressed type about the orbit cause a shifting of the attachment of the ocular muscles, resulting in a diplopia. This we have seen on several occasions, and later attempts at correction of the bony defect have not resulted in correction of the diplopia.

Of all these fractures about the face, the most frequent that we see is the compound fracture of the mandible, with a discharging sinus in the submental or

submaxillary region. When these cases come in after a period of a month or six weeks following the injury with a sinus, it is almost invariably due to a sequestrum, and the sinus promptly heals with the removal of the sequestrum.

To recapitulate, let me emphasize that in the average automobile injury, while it may involve the face, there are often associated injuries elsewhere of varying gravity and consequently it behooves each medical man to familiarize himself to some extent with the principles of plastic surgery, of thoracic surgery, of abdominal surgery, of orthopedic surgery and neurosurgery in their relation to injuries. And, because of the various injuries that may be sustained in the same accident, even though a patient comes in with injuries about the face and the head, a general survey of the individual should be made.

Dr. Brown (closing).—Dr. Padgett's mention of the use of the lower jaw to support the upper is important even though space does not permit a full discussion of details of fixation. If there is ever any question of normal occlusion in the jaw fractures, the best solution is to fix the jaws in normal occlusion during the healing period. When the lower jaw is used to support the upper, then a simple bandage from vertex to chin usually suffices, and often, after just a few days, the closing muscles of the lower jaw seem to hold the jaws so firmly that no further support is necessary.

THE ROENTGEN TREATMENT OF CARCINOMA OF THE LARYNX AND HYPOPHARYNX*

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The purpose of this paper is to discuss some of the clinical problems confronting the radiologist in the treatment of cancer of the larynx and hypopharynx and to analyze the results obtained by surgery and by therapeutic radiology.

INCIDENCE

Cancer of the larynx accounts for 1.8 per cent,[27] 3 per cent,[10] 4 per cent,[11] of all malignancies. In males it occurs 5.3 per cent[1] of all cancers and in females in 0.48 per cent.[1] Various estimates agree that about 90 per cent[4 7] of all laryngeal cancers develop in males and only about 8 per cent in females. The disease is more than 10 times[1 35] as frequent in males. The greatest incidence as regards age[1 4] is from 60 to 64, with an average age[7 23] of 55 or 57. Only 0.64 per cent[1] occur under twenty-five years of age.

ETIOLOGY

No definite etiologic factor is known to produce cancer of the larynx. Heredity, long-continued irritation, excessive use of the voice, the abuse of alcohol or tobacco have been mentioned as provocative agents but without substantiation.

CLINICAL CLASSIFICATION

In the literature the clinical classification of cancer of the larynx is confusing because various authors have grouped different structures under the same heading. This is particularly true of extrinsic cancers of the larynx and hypopharynx. An accurate and uniform classification is necessary for comparing the results of treatment, because malignant tumors of structures only a few millimeters apart differ markedly in their symptomatology, clinical course, prognosis, histopathology, radiosensitivity, treatment and curability. A combination of the classification suggested by Quick[25] and that used by Thomson[20] has proven useful (*Fig. 1*). Laryngeal cancers are grouped into intrinsic and extrinsic types, depending on their point of origin. Certain lesions grouped by some as extrinsic should be listed as cancers of the hypopharynx.

In *intrinsic* cancer the tumor is limited to an involvement of the vocal cords, false cords, ventricle with or without an involvement of the laryngeal surface of the arytenoid cartilages. The growth must remain within the laryngeal box. About 98 per cent[17] of intrinsic cancers start in the vocal cord, usually in the anterior two-thirds on the free edge and upper surface. Subglottic cancer may be considered as a subdivision of intrinsic cancer.

In *extrinsic* carcinoma of the larynx the lesion arises on the external surface of the supporting framework of the larynx, which includes the arytenoids and aryepiglottic folds. Lesions of the epiglottis are usually grouped as extrinsic. Large intrinsic cancers which extend to the exterior of the laryngeal box are classified as extrinsic cancer because they are treated in a similar manner. Such cases are usually in advanced states of the disease. Thomson[20] lists them as mixed cancers of the larynx.

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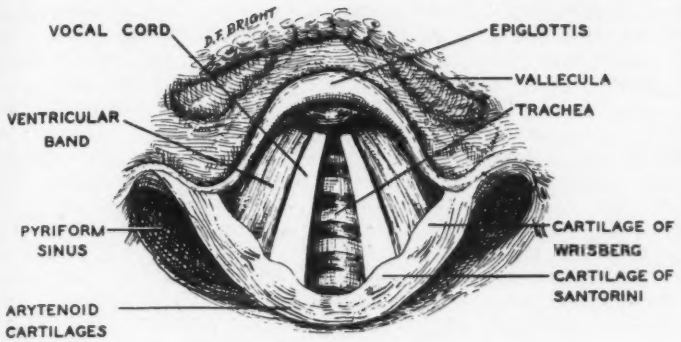

Fig. 1

Diagram of Normal Larynx as Seen with the Laryngeal Mirror.

The vocal cord, ventricular band, ventricles and the laryngeal surface of the arytenoid cartilages are the structures included in intrinsic cancer. Subglottic cancer is usually considered as a subdivision of intrinsic cancer. Extrinsic cancer includes the epiglottis, aryepiglottic folds, and the external surface of the arytenoid cartilages. Large intrinsic cancers that have extended to the exterior of the laryngeal box are grouped as extrinsic because they are treated in a similar manner. Cancer of the hypopharynx includes the pyriform sinuses and the postcricoid area.

Cancer of the *hypopharynx* includes lesions of the pyriform sinuses and postcricoid area, as these lesions are more closely allied to cancer of the pharynx.

DIAGNOSIS

The diagnosis of cancer of the larynx and hypopharynx is made by inspection of these structures either indirectly with the laryngeal mirror or directly with the laryngoscope. The examination should be done by a competent laryngologist and must include a thorough inspection of the pharynx, hypopharynx, and larynx. A biopsy is necessary to insure a positive diagnosis. Biopsies are frequently of value in determining the degree of malignancy of a lesion, which may in turn influence the treatment and prognosis. The lesion must be distinguished from syphilis and tuberculosis. A Wassermann test of the blood and a roentgenogram of the chest should always be made as it is possible to have either of these lesions together with a cancer. Several authorities[36 37 38 40 41] require a lateral roentgenogram of the neck as a supplementary study of the epiglottis, the ventricle, the laryngopharynx and the subglottic space. Imperatori[26] and Jackson[37] study the larynx under the fluoroscope to determine abnormal or absent mobility of the laryngeal structures during respiration, phonation, and deglutition. Body section radiography (laminagraphy,[43] tomography[39]) is also of value for visualizing the laryngeal structures in the anteroposterior plane.

SYMPTOMS AND COURSE OF DISEASE

Intrinsic cancers are most frequent, constituting 72 per cent[4] to 75 per cent[35] of all laryngeal malignancies. About 94 to 98 per cent* are squamous cell carcinoma. The remaining percentages are made up of basal cell carcinoma (2 per cent[9] to 4 per cent[4]), adenocarcinoma, sarcoma, and other rare forms. The disease spreads very slowly, and as long as it remains limited to the interior of the larynx, it does not metastasize to the lymph nodes. The cardinal symptom of cordal cancer is hoarseness. In the words of Jackson[17]

> "Chronic or intermittent hoarseness of only a few weeks' duration means cancer until it is proven otherwise."

Dyspnea soon results from an interference with the air passage. To quote Sir St. Clair Thomson[20],

> "There is no internal region of the body where cancer gives such an early warning of its appearance, where it is so slow in its evolution, and where it so long remains localized, as on a vocal cord. In no other internal situation can surgery secure such enduring freedom from disease."

Extrinsic carcinoma is recognized by laryngologists as constituting about 20 per cent[9] to 23 per cent;[4] however, Tucker[4] recognizes that an additional 12 per cent of intrinsic carcinomas have advanced sufficiently to spill over the laryngeal brim to become extrinsic. The areas involved by extrinsic cancer have a rich lymphatic system. In extrinsic cancer the invasion is insidious, the disease is not sharply circumscribed, it is usually very malignant, and before its presence is felt by the patient, it has frequently invaded the lymph nodes. The early symptoms are vague. Most commonly there is a feeling of discomfort in the pharynx or a "lump" in the throat. Sometimes a slight embarrassment in swallowing is the first symptom. Hoarseness, dysphagia, pain, fetor, hemorrhages, cachexia, are all symptoms of the terminal phases of the disease.

*94 per cent,[1] 95.5 per cent,[4] 96 per cent,[9] 98 per cent.[17]

Carcinoma of the hypopharynx differs very little in the symptomatology from that of extrinsic carcinoma. The symptoms, however, are predominantly the result of interference with deglutition.

TREATMENT

Intrinsic Cancer.—In the handling of intrinsic cancer limited to the cord (cordal cancer) laryngofissure is the treatment of choice. Laryngologists uniformly report 76 to 82.3 per cent* five-year survivals, a percentage of "cures" which is the highest obtained in the treatment of any malignancy within the body. We feel that laryngofissure is indicated in small cancers localized to the cord. In slightly more advanced cases, a very small number, total laryngectomy may be indicated, particularly if the lesion is of a high grade of malignancy. Unfortunately, relatively few patients are observed at a stage sufficiently early to permit the use of a simple and efficient laryngofissure. Clerf[3] found that only 32 per cent of his cases of laryngeal cancer were suitable for a laryngofissure. Tucker[4] found 24 per cent, New[7] 31 per cent, Looper[11] 20 per cent, and Jackson[12] 23 per cent. This means that 70 to 80 per cent of all people with cancer of the larynx have to be treated by more extensive and radical surgical measures or by irradiation.

Extrinsic Cancer.—The treatment of external cancer applies not only to the 20 per cent[9] or 28 per cent[4] that are extrinsic in origin, but also to the large group of intrinsic cancers that have become extrinsic by their invasion outside the laryngeal box. These two groups make a total of 60 to 70 per cent of all cancers of the larynx. Of this number some 14.7 per cent[35] to 30.5 per cent[4] had palpable metastases to the cervical nodes. The question of the type of treatment to be employed in these cases is debatable.

Surgical Treatment.—A conservative group of men such as Thomson[20] and Imperatori[26] feel that any surgical treatment is relatively hopeless for the cure of extrinsic cancer. Tucker[4] performs a total laryngectomy on 15 per cent and considers 44 per cent of all laryngeal cancers unsuitable for surgery. Clerf[3] did a total laryngectomy on 27 per cent and states that 40 per cent had advanced to the point where surgical treatment of even a radical nature was not justified. Jackson and Jackson[16] report that 62 per cent of all laryngeal cancers are in an incurable state.

More aggressive surgeons like New[7] perform a total laryngectomy on 68 per cent of their cases. Looper[11] uses this operation on 80 per cent of his patients, and Orton[35] on the very high percentage of 92. We were unable to find figures for five-year survivals on only cases of extrinsic cancer treated by laryngectomy. Lewis's[2] report of 38.5 per cent five-year survivals includes cases of operable intrinsic cancer. The same is true of New and Figi[8] with 56.1 per cent five-year survivals, but whose cases also received roentgen therapy pre- and postoperatively. Trotter[15] and New[7] and Figi[8] have improved the technic for pharyngotomies and lowered the operative risks, but have not reported a satisfactory series of three- or five-year survival percentages to convince us that it is the treatment of choice.

The operation of total laryngectomy has many disadvantages. The chief handicap is the permanent loss of the voice which all too often deprives the individual of his livelihood.

The surgical treatment of extrinsic cancer of the larynx can be summarized by saying that there is a wide difference of opinion among laryngologists as to the desirability, justification, indications and curability offered by total laryngectomy. Pharyngotomy, despite improvements in technic, has a high mortality and can be adopted by only the specialized operator. With this picture in mind, the problem confronting the radiotherapist is what can roentgen therapy offer this unfortunate group of people with advanced intrinsic and extrinsic cancer.

Treatment by Roentgen Irradiation.—In the past, x-ray treatment of these patients has been confined to those considered hopeless. With the introduction of the protracted and fractional principle of roentgen irradiation by Coutard, and his excellent results, many laryngologists began to cast a critical eye on the evaluation of extensive and crippling operations, if the same results could be approached by x-ray treatment. Many laryngologists[4 5 11 14 2 13 3] are still skeptical of the benefits of irradiation and are only willing to send the radiologist the incurable and hopeless cases. Others, such as New[7 33] and Figi[8] advocate pre- and postoperative irradiation of high grade, malignant intrinsic and extrinsic carcinomas as the best method of combating the disease. Jackson and Jackson[17] feel that the newer forms of roentgen irradiation are now so efficient as to be indicated in many patients for whom laryngectomy would otherwise be advisable, and to quote them,

"We are turning over to him (the radiologist) with

*76 per cent,[27] 82 per cent,[16] and 82.3 per cent.[7]

confidence certain cases of cancer of the larynx in the curable stage."

Other laryngologists[26 22] share this opinion, which is probably a fairly accurate expression of the views held by most laryngeal surgeons today.

Radiotherapists in general have been favorably impressed by the possibilities of roentgen treatment. Lenz[28] reports that in certain types of laryngeal cancer roentgen irradiation has replaced surgery; in others it is a valuable adjunct to surgery, and in others it is only palliative. The most enthusiastic are Martin[24] and Quick,[25] who consider that total laryngectomy has been rendered obsolete by the present status of radiation therapy. It is our sincere hope that the future will bear out this statement. As yet, we feel that additional reports of three- and five-year survival "cures" are necessary before adopting this practice. Especially so, since Coutard, in his recent exhibit at the American Medical Association meeting, still considers that laryngectomy is suitable for a few lesions.

The results of roentgen treatment for extrinsic cancer of the larynx are as few as those for surgery. Martin[24] states that about 20 per cent will have a five-year cure and Coutard 21 per cent. For cancer of the larynx Coutard[30] reports 27 per cent five-year survivors. Juul[32] reviewed the reports on two-year survivals following roentgen irradiation and found them in line with those reported by Coutard. Since most of the patients in our series of 30 cases have been treated within the past four years, they are not worthy of analysis. The prompt disappearance and control of the primary lesion in many advanced cases makes us anticipate a favorable percentage of five-year survivals. In our opinion, the present trend in the treatment of extrinsic cancer of the larynx and hypopharynx is strongly toward the more frequent use of roentgen therapy.

The principles and technic of Coutard's method are generally well known. In the main we have carried out his plan of fractionated and large total dosage, but have had to sacrifice the principle of protraction of the daily dose because of the exigencies of an overcrowded therapy department. We originally started with 200 kv., 15 milliamperes, 1 mm. of copper filter, and 1 mm. of aluminum filter, with a target-skin distance of 50 cm. and using 2 areas. During the past two years 3 areas have been used, 2 lateral areas of 50 sq. cm. each and 1 anterior area of 27 sq. cm. (*Fig. 2*). If the cervical lymph nodes are invaded by metastases, the lateral fields are increased to 100 sq. cm. The daily dosage is small and varies from 100 to 300 roentgens measured in air. During the first week the dosage is about 100 roentgens daily, and if no edema of the laryngeal structures develops, the daily dosage is increased until a total of 3,000 roentgens has been given to each lateral area, and 2,000 roentgens to the anterior area.

With this set-up we measured the percentage depth dose at the center of the larynx and in the hyopharynx. To do this we obtained a cadaver and placed the ionization chamber within the larynx at the level of the cords (*Fig. 3*). Readings were then obtained. The procedure was then repeated with the ionization chamber in the hypopharynx (*Fig. 4*). Readings were also made for copper filters, 0.25 mm., 0.5 mm., 1.0 mm. and 2.0 mm., in thickness for various sized ports, including 27 sq. cm., 50 sq. cm., 65 sq. cm., and 100 sq. cm. The only readings we shall discuss are those obtained for the technic we use for treating cancer of the larynx which are shown in *Chart 1.*

A total dosage of 14 T. E. D.* for the larynx and 11 for the hypopharynx seems adequate since Martin and Quimby[45] estimate that 10 threshold erythema doses are required for the control of adult squamous cell carcinoma. These

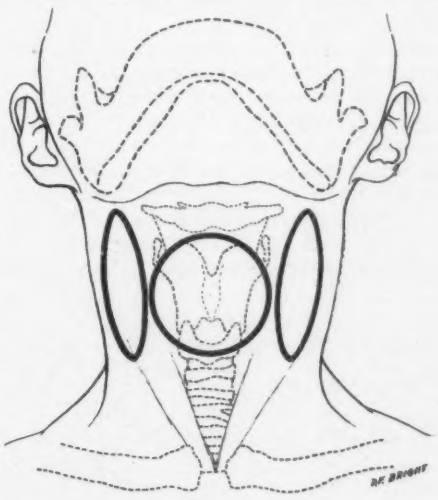

Fig. 2

Diagram showing the relationship of the three fields on the neck that are used in the treatment of cancers of the larynx and hypopharynx.

*Threshold erythmea dose.

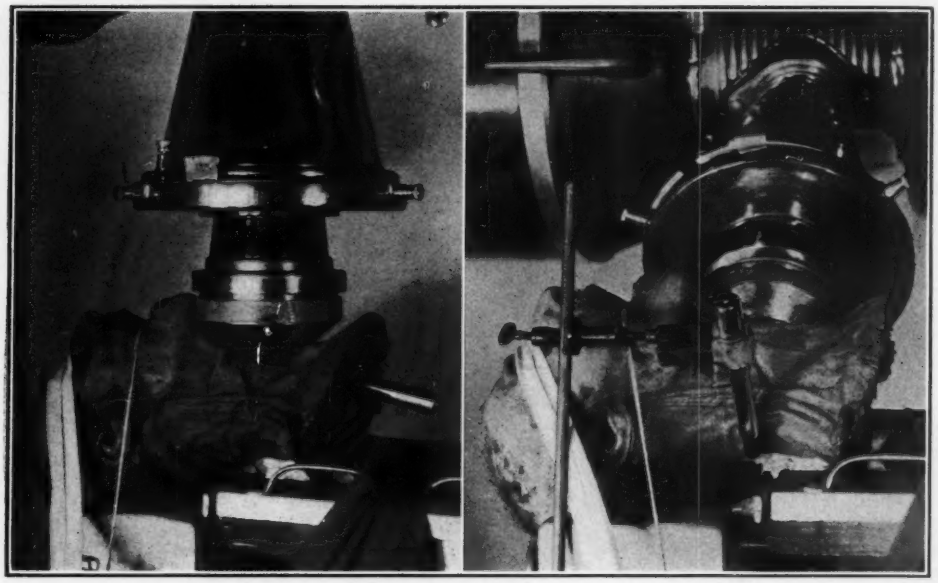

Fig. 3

(Left)—Photograph showing the method of obtaining measurements for depth dosage within the larynx. The ionization chamber is placed in the trachea and pushed up to the level of the cords. Depth dose measurements of the hypopharynx are made by placing the ionization chamber in the esophagus and pushing it upward until it is in position.

(Right)—Method of measuring the emergent beam. The ionization chamber is in contact with the posterior and lateral aspect of the opposite side of the neck.

measurements were obtained from a rather small neck measuring 31.5 cm. in circumference. It is interesting that the depth dose obtained by this experiment closely approximates the dosage obtained by the use of the depth dose charts prepared by Quimby and Marinelli.[47] In applying Coutard's method we have not adhered to a rigid plan, since Coutard himself follows none. The treatment is considered as a clinical procedure and requires careful, daily observation of the local changes and the general systemic reaction of the patient. The daily and total

Chart 1

Field	Skin Dosage	Larynx Depth Dose	Hypopharynx Depth Dose
Anterior 27 sq. cm.	2000 r	100.6 per cent 2000 r	81.2 per cent 1600 r
Rt. Lateral 50 sq. cm.	3000 r	93.7 per cent 2800 r	72.8 per cent 2175 r
Lt. Lateral 50 sq. cm.	3000 r	93.7 per cent 2800 r	72.8 per cent 2175 r
		7600 r	5950 r
Total dosage		14.4 T. E. D.	11.3 T. E. D.

Fig. 4

A section made through the neck at the level of the cords to show the distance from the lateral ports to the center of the larynx and to the center of the hypopharynx as well as the distance of the posterior port from these structures. Note that the contour of the neck approximates a crude hexagon and how the lateral ports are naturally directed away from each other. Thus the dosage contributed by the emergent beam to the skin of the opposite side is greatly reduced.

dosage and size of the field may be modified at any time during the course of the treatment. In this connection we should like to mention the extent to which the size of the field influences the total dosage that can be administered safely. This is clearly demonstrated by Martin's[46] work in the accompanying chart.

Size of Field	Total Maximum Dosage
7 cm. diameter	4,200 r
15 cm. diameter	3,600 r
20 cm. diameter	2,800 r

CONCLUSIONS

In conclusion, we want to emphasize certain facts about the treatment of cancer of the larynx.

(1) The treatment of intrinsic cancer limited to the cord appears to be laryngofissure until larger and more impressive series of five-year cures by roentgen irradiation are published.

(2) In the treatment of extrinsic cancer of the larynx laryngologists are referring more and more cases in a curable stage to radiologists for treatment. This tendency will become stronger with the publication of anticipated series of five-year cures which are just now beginning to appear in the literature. This statement also applies to even moderately advanced intrinsic cancers of the larynx.

Laryngologists are also casting a critical eye on the value of total laryngectomy and pharyngotomy for the treatment of patients with extrinsic cancer. Radiologists in general favor a more extended use of radiation therapy for this group of lesions, and a few of them advocate radiation to the exclusion of surgery, a view which needs further substantiation.

(3) Pre- and postoperative roentgen treatment for both intrinsic and extrinsic lesions is of definite value in increasing the percentage of five-year cures obtained by surgery.

(4) Roentgen therapy, when successful, leads to a better rehabilitation of the functions of the larynx and hypopharynx.

(5) We want to emphasize the need for a more accurate classification of cancers of the larynx and hypopharynx so that reports of curability can be more accurately compared.

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DISCUSSION (*Abstract*)

Dr. Charles L. Martin, Dallas, Tex.—Dr. Scott has presented an excellent review of the modern trend in the radiologic treatment of malignant tumors of the larynx and I can find fault with nothing except his extreme conservatism. Our experience with these lesions in the Baylor tumor clinic has led us to attempt a cure with radiation in all cases. If we are successful, the cosmetic result is superior to that obtained with surgery, and when early lesions do not completely disappear laryngofissure can still be done.

Our most troublesome problem has been the care of the secondary pneumonitis which frequently appears during the reaction stage in patients with advanced lesions and partial obstruction. This complication cannot always be prevented by tracheotomy, and has on several occasions proven fatal after satisfactory regression of the malignant tumor has occurred. Such cases are now hospitalized and receive the constant care of a good internist throughout the course of treatment.

Although the essayist did not discuss transitional cell carcinoma of the upper pharynx, this condition has received special attention in our clinic and with your permission I will briefly review our conclusions. A series of patients treated with heavy doses of x-rays delivered to the neck several years ago was carefully followed up. In every instance the primary lesion remained well, but most of the cases returned at a later date, showing either cranial nerve disturbance from extension into the cranial cavity or pulmonary symptoms from invasion of the mediastinum. We have, therefore, adopted the plan of following the usual treatment of the pharynx with a second series directed at the floor of the skull and the mediastinum in all early cases. Theoretically, at least, this procedure should increase the number of 5-year cures, which has in the past been surprisingly small.

INTRAVENOUS UROGRAPHY*

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Intravenous urography is unquestionably one of the most important and accurate procedures in diagnostic radiology, but it is not being used on the widespread scale that is fully justified. This, we believe, is largely due to the following facts:

(1) Improper technic in many hospitals and clinics has prevented the clear-cut pyelograms which are possible by this method.

(2) In papers published to date, practically every author has emphasized the limitations of the procedure, and has stressed the necessity of retrograde examinations, in a large percentage of cases, especially when early changes in the pelvis and calyces are to be demonstrated on the pyelogram.

(3) The medical profession as a whole is not fully aware of the large number of diseased conditions of the urinary tract which can be clearly shown by intravenous urography.

(4) Many gross pathologic changes in a kidney may give few if any symptoms directed to the urinary tract, especially in the early stages of involvement, due largely to the fact that one normal kidney can perform the work of two. This paper, except for a few case reports, will deal largely with a discussion of these four points.

With the patient properly prepared, a sufficient quantity of the dye and proper roentgen technic used, excellent, clear-cut pyelo-ureterograms can be obtained in a very high percentage of all cases. Where the kidney function is extremely poor or in large individuals with fetal types of pelves and calyces, this procedure naturally will not give satisfactory pyelograms.

The intestinal tract must be cleared out, at least 30 c. c. or more of the dye used, and fluids must be withheld for at least 12 hours before the dye is given. For breakfast the day of the examination, half a glass of orange juice has seemed definitely to limit the formation of gas.

Immediately after the dye is injected a small sheet, folded and tightly rolled so as to fit in between the crests of the ilia, is placed in this

*Read in Section on Radiology, Southern Medical Association, Thirty-Second Annual Meeting, Oklahoma City, Oklahoma, November 15-18, 1938.

position and the rubber compression bag applied over this. The ureters are best compressed at the upper bony outlet of the pelvis; therefore pressure must be fairly high up. The sheet is rolled so as to be a little large on the left side since the left ureter, due to its anatomical location, is a little harder to obliterate than the right. In this way both ureters can usually be almost completely blocked and excellent pyelograms can be obtained.

In the average case the examination is complete in fifteen to twenty-five minutes but from the first film on each, one must be developed and seen by the radiologist and further examinations directed by him. The findings on one film suggest varying technics; positions of the patient, tube, etc., and the length of time that the kidneys must be watched. A diagnostic film in many instances is obtained in a poorly functioning kidney with obstruction, by having the patient return several hours after the usual examination would have been completed.

Stereoscopic films or those made with the patient on the side, or with the patient lying on the abdomen, may give diagnostic pyelograms obtainable by no other method. When pressure is released and immediate films made usually the ureters throughout can be clearly demonstrated. Any obstruction will naturally be noted. The location of calculi in any portion of the urinary tract is usually brought out.

Intravenous urography is ideal for the location of calculi in the urinary tract for two reasons:

(1) Films can be made from many different angles while the pelves and ureters are filled with the dye.

(2) Early films show a less dense pyelogram or ureterogram and very dense stones can be seen through it, while later in the examination only fairly opaque or translucent shadows show

Fig. 1, Case 1

J. J. H., a white man, 48 years old, had a mass in the upper right abdomen. An intravenous urogram showed unilateral fused kidneys with clear-cut pyelograms with ureters showing throughout their course. As is more or less characteristic of this condition, the ureter from the lower pelvis crosses the spine to enter the bladder in normal position.

Fig. 2, Case 2

J. W. P., a white woman, 41 years old, entered the hospital for a pelvic operation with no symptoms referable to the urinary tract. There were a few pus cells in the urine. The intravenous urogram showed a normal left kidney. On the right side there was marked hydronephrosis with cortical necrosis.

Fig. 3, Case 2

Specimen shows hydronephrosis with cortical necrosis. At operation an aberrant vessel was found. This was probably the primary cause of her condition.

Fig. 4, Case 3

S. T. A., a white man, 43 years old, had a hernia operation in July, 1936. He was catheterized several times. The urine was negative. Six weeks later he had a temperature of 102° and a few pus cells in the urine. The intravenous urogram showed a normal left kidney and on the right side an enormous hydronephrosis with cortical necrosis.

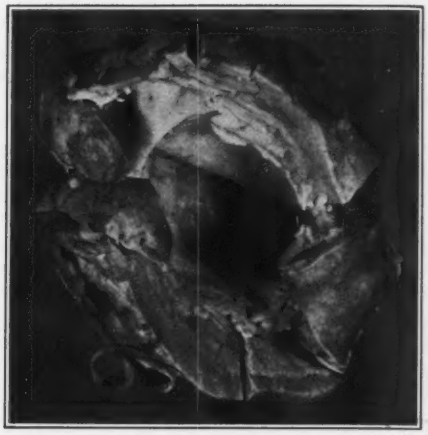

Fig. 5, Case 3

The specimen shows marked cortical necrosis and hydronephrosis. There was partial obstruction at the ureteropelvic juncture due to an aberrant vessel.

Fig. 6, Case 4

F. G., a white woman, aged 30, had had her left kidney removed one year previously for numerous stones plus an extreme degree of cortical necrosis. Because of pain in the right upper abdomen a retrograde pyelogram was made. This showed the ureter displaced toward the midline, one of the lower calyces not filled and a mass over the lower kidney area. It was thought that she probably had a tumor of the lower pole of the kidney, but since she had only one kidney, further investigation was necessary.

in the very opaque dense media. This enables us to see many calculi which are not demonstrable when one strength solution is used, as is necessary in retrograde pyelography.

The reason why many authors have placed many limitations on the usefulness of this method of examination, and it is frequently said that early changes in the pelvis and calyces cannot be shown by this method, is due entirely to the fact that they have seen only the poor pyelograms which are produced by an improper technic. In the large majority of all cases seen there is no excuse for this type of pyelogram today.

The final results of examinations of this kind are inexcusable. Clear-cut excellent pyelograms are possible, but many cases are examined by routine five, ten and twenty cent methods which are too common today. This method of examination is a real boon to mankind and the medical profession, but only when each case is individualized and a proper technic is used throughout.

Those experienced in this field know that tuberculosis, tumors benign or malignant, cortical necrosis of various types, abscess or carbuncle, calculi, pelvic, calyceal or ureteral, hydronephrosis with marked or slight kidney damage from congenital abnormalities such as aberrant vessels, ureteral obstructions from bands or adhesions, urinary extravasations from rupture of the kidney or extravasations from rupture from infection, or perinephritic abscess, can usually be demonstrated by this examination.

Due to the fact that one healthy kidney can compensate for slight or grave damage of its mate, one kidney may, not unusually, be slightly or grossly damaged without symptoms directed to the urinary tract. Many times a physician will have a slight suspicion of something wrong in the urinary tract but will not feel justified in putting this patient through a general urologic examination. Frequently examinations of this kind will disclose unsuspected and unexpected kidney lesions. Just such examinations have in our experience demonstrated a large variety of diseases of the kidney as for instance, malignant

Fig. 7, Case 4

The intravenous urogram showed the same findings as the retrograde except that the lower anterior calyx was filled and definitely distorted by a mass in this area. Stereoscopic films showed the distorted calyx to be anterior.

Fig. 8, Case 4

A film made with the patient on the abdomen proved conclusively that she had a well circumscribed tumor involving the lower anterior portion of the kidney, probably a large solitary cyst. This was confirmed at operation.

or benign tumors, tuberculosis, cortical necrosis of various types, hydro or hydropyonephrosis from aberrant vessels, stone, etc. Many other conditions such as horseshoe kidney, unilateral fused kidneys with or without infection and cortical necrosis entirely unsuspected, multiple ureters and pelves with disease in a pelvis that had not been previously demonstrated by other examinations have been found.

In a fairly large number of patients who have a short time previously had abdominal operations for disease of the appendix, the gallbladder, etc., we have been able a few weeks later to show that the real trouble was in a kidney and not in these other fields.

This is, I believe, full proof that except in an emergency, no obscure abdominal case should be operated upon until intravenous urograms have been properly made.

Modern urology offers a great deal today in the treatment of many medical and surgical diseases of the urinary tract. The fear of a complete cystoscopic examination has prevented many people from consulting the urologist. After an intravenous urogram has been made and if the diagnosis is not definite, almost all of them will submit to further study by the urologist. If there are symptoms referable to the urinary tract a thorough urological examination is necessary in spite of a negative urogram.

The radiologist must be fully aware of his limitations and realize that a thorough urological study, in addition to the changes found on the intravenous urogram is necessary in many cases.

CONCLUSIONS

(1) Intravenous urography is an extremely valuable diagnostic procedure when properly done.

(2) It deserves to be more generally used and will disclose many unsuspected kidney lesions.

(3) In addition to its value as a diagnostic procedure, intravenous urography is a great help in many instances as a test of kidney function.

(4) Except in an emergency, no obscure abdominal case should be operated upon until an intravenous urogram has been made.

(5) When this procedure comes into more general usage certainly many lesions of the urinary tract will be found in their earlier stages of development, enabling the urologist to obtain better results than have been possible in the past.

THE USE OF TESTOSTERONE PROPIONATE IN PROSTATIC HYPERTROPHY*

By REX BOLEND, B.S., M.D.
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That the male sex hormone exerts some influence which enables the patient with prostatism more completely to empty his bladder is an established fact. Just how this is accomplished is not known. Morell suggests that the hormone produces a hyperemia of the genitals, as a result of which the testes produce more hormone and thus control the size of the prostate gland. Wugmeister feels that the prostate is hypervitalized during the period of active sex life due to a deficiency of estrogen, and that later in life this hypervitalization results in hyperplasia.

Lower, Engle and McCullagh reported forty cases treated with desiccated bovine testes which they feel contained a hormone which they call "inhibin." Some of these patients had complete retention and all presented the typical signs and symptoms of dribbling, small stream, nocturia, urgency and frequency. In this series, they considered 65 per cent were markedly improved or symptom free.

Lately, Walther and Willoughby, of New Orleans, have shown that the use of the male sex hormone does influence the picture typical of the patient suffering from enlargement of the prostate. They feel that

> "Prostatic hypertrophy is no longer an independent entity, but is inseparably bound up with endocrine changes affecting the pituitary and testes."

In a recent paper, I reported the results obtained with the use of testosterone proprionate in twenty-three unselected cases of enlarged prostate with urinary retention.

As shown in *Table 1,* twenty-three patients were treated. There were twelve cases of simple benign hypertrophy, nine of prostatic hypertrophy complicated with chronic prostatitis, one of carcinoma of the prostate, one of post-resection with dribbling. The analysis shows ten patients, or 43.5 per cent, clinically well or symptom free; seven patients, or 30.5 per cent, improved; and six, or 26 per cent, with no improvement. The patient with carcinoma, remarkable as it may seem, showed a 50 per cent

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*From the Department of Urology, University of Oklahoma School of Medicine.

Table 1

TWENTY-THREE CASES IN WHICH TESTOSTERONE, PROPIONATE WAS USED

Type of Case	No.	Improved or Symptom Free	Improved	No Improvement
Prostatism without infection	12	9	3	0
Enlarged prostate with chronic infection	9	0	3	6
Malignancy	1	0	50 per ct.	
Post-resection with dribbling	1	1		
TOTALS	23	10 or 43.5 per ct.	7 or 30.5 per ct.	6 or 26 per ct.

improvement. It will also be noted that all failures were in the group of enlarged prostate with chronic infection, complicated by other pathological conditions. Five patients died. Two of the five on entering the hospital showed marked senility, cardiac insufficiency, and arteriosclerosis. One patient had hypertension with heart disease and pyelonephritis; one patient developed pneumonia 18 days after entering the hospital; and one patient, due to a confusion of orders, was resected and died three days postoperative. The operative case is counted as a failure in this table, even though it was showing some clinical response.

Critical examination of our clinical data and work sheets shows that while ten patients in *Table 1* are clinically well and symptom free, some of them carry from five to thirty c. c. of residual urine. The patient giving the most striking clinical response has 130 c. c. of residual urine. These patients, however, all consider themselves cured.

In a later series of thirty-five patients, the clinical course corresponded very much to the above table except that there was a higher percentage of beneficial results due to the fact that only patients with uncomplicated benign hypertrophy were used.

It has not been possible to demonstate conclusively by palpation or cystograms that the prostate is actually reduced in size. Hence, in our efforts to determine how and why these patients are able to empty their bladders more completely, we turned to the histological study of sections from the prostate of patients treated with varying amounts of the hormone. Careful and accurate clinical data with biopsies before and after treatment were kept in seven such cases. While this is much too small a number from which to draw definite conclusions, some very interesting changes occurred which we believe are consistent enough to report at this time.

Procedure.—Typical cases of prostatism with urinary retention were used. From each patient one piece of prostatic tissue was taken from the lateral lobe at the point near the vesicle neck with a Caulk punch or McCarthy resectoscope. The patient was then given 10 mg. of testosterone propionate three times a week until 150 to 200 mg. were given, at which time another biopsy was made.

Due to the limited space, we shall present only two of the typical cases in this series.

Case 1.—Garrett, 63 years of age, entered the hospital with all the usual signs of prostatism. The most prominent symptoms were burning, dribbling, nocturia, and frequency. For the preceding three years, he had had an increasingly smaller stream with intermittent dysuria. Examination showed a trilobar enlargement of the prostate, Grade 3. On entrance he had a residual urine of 60 c. c. In *Fig. 1* you will notice the large amount

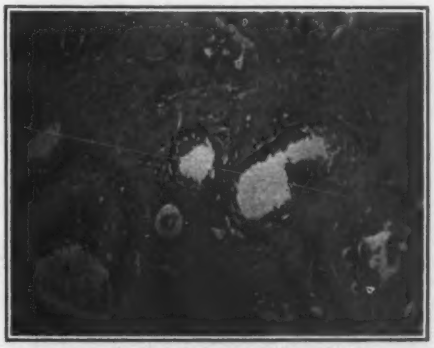

Fig. 1, Case 1

Garrett (S 11). Biopsy before treatment. Patient was 63 years old. Trilobar enlargement of the prostate, Grade 3. Residual of 60 c. c. on first examination. Note the large amount of stroma and numerous hypertrophied glands; papillary projections into the lumina, and moderate inflammatory infiltration.

of stroma with numerous hypertrophied glands showing an occasional papillary projection. There is moderate inflammatory infiltration. He was given 180 mg. of testosterone over a period of 60 days, at which time another biopsy was made. In *Fig. 2* you will see a marked replacement of the stroma by glandular tissue and a less amount of inflammatory reaction. This is a very striking example of what we think takes place, since there was no enlargement of the prostate as a whole. This second figure shows an exaggeration of the glandular hypertrophy and hyperplasia as compared to *Fig. 1*. The question might arise that sections taken at the time of the first biopsy from other areas in the prostate might have shown similar changes. This is true, of course, due to the histology of the prostate. But after carefully working over many fields, we feel that these findings are consistent and that there is a definite replacement of the stroma by the glandular tissue.

Case 5.—Ray, a 63-year-old patient, entered the hospital with complete retention. He was mentally sluggish and toxic on entrance. A biopsy was done four days after admission and *Fig. 3* shows a large amount of hyperplasia of the stroma, the stroma almost covering the field with very small acini and these filled with prostatic material. Here we notice the infiltration of chronic inflammatory cells. He was given 140 mg. of testosterone at the rate of 10 mg. three times a week, and a second biopsy was done. *Fig. 4* shows definite replacement of the stroma with glandular tissue and only a few very small papillary projections protruding into the acini. The patient left the hospital at this time for 30 days. On re-entering he was given 50 mg. of testosterone over a period of 11 days, and a third biopsy was done. In *Fig. 5* you will see a marked replacement of the connective tissue by glandular tissue and that the inflammatory signs are markedly diminished. At the conclusion of treatment, the patient reported 100 per cent improvement in clinical results. This is a very striking case which demonstrates clearly the relationship between the clinical and histological findings.

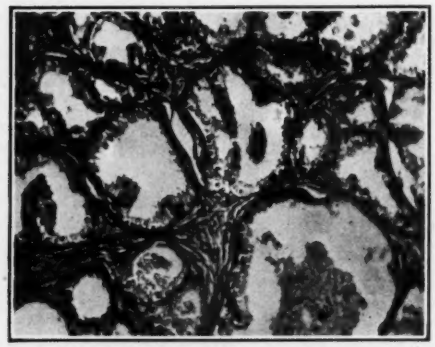

Fig. 2, Case 1

Garrett (S 13). Biopsy after 180 mg. of testosterone in sixty days. Note the marked replacement of the stroma by glandular tissue and the smaller amount of inflammatory reaction.

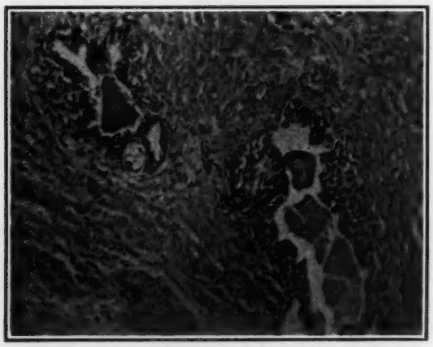

Fig. 3, Case 5

Ray (S 25). Biopsy before treatment. Patient 63 years old with complete retention. Note the large area of hyperplasia of the stroma, almost covering the field with small acini filled with prostatic material. Also note the infiltration of chronic inflammatory cells.

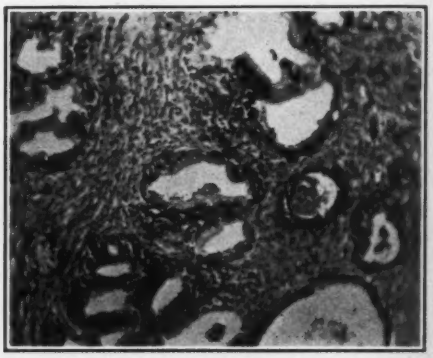

Fig. 4, Case 5

Ray (S 27). Biopsy after 140 mg. of testosterone. This shows definite replacement of the stroma with glandular tissue. Only a few small papilla protruding into the acini.

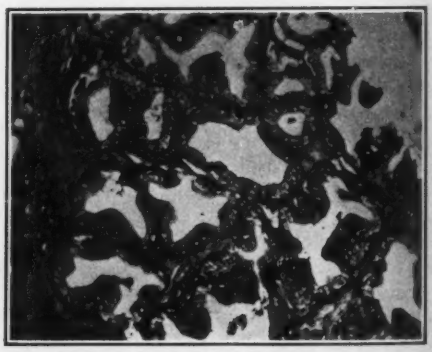

Fig. 5, Case 5

Ray (S 31). After 30 days' rest, an additional 50 mg. of testosterone were given over a period of 11 days. There is marked replacement of the connective tissue by glandular tissue and inflammatory signs are markedly diminished.

A review of the findings in this series of prostatic biopsies, taken before and after testosterone therapy, indicates three changes in the gland following treatment:

(1) An exaggeration of glandular hyperplasia.

(2) A reduction or at least no increase in the stroma.

(3) A reduction in the inflammatory reaction.

If there is any change in the individual epithelial cells the change was not constant enough to be significant in this series.

I wish to acknowledge a debt of gratitude to Dr. Floyd Keller, who did the pathological work in this series, and also to Dr. Wayne Hull for the photography.

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THE CONSERVATIVE MANAGEMENT OF APPENDICAL PERITONITIS*

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Immediate removal of the acutely inflamed appendix before perforation occurs represents the only means of controlling the appalling mortality of this disease. But until every member of the public and of the profession has been educated in regard to the dangers of catharsis in the presence of abdominal pain, in the recognition of typical and atypical forms of the disease, and in the necessity for early operation, surgeons will continue to see a large proportion of their patients only after perforation of the appendix has occurred.

In our experience, approximately one in every four patients with appendicitis is admitted with peritonitis. Finney[1] found 37.5 per cent; Keyes[2] 50.3 per cent; and Ochsner, Gage, and Garside[3] 78.7 per cent with extension of infection beyond the appendix when patients were first seen. It is this group with appendical peritonitis which maintains the high mortality of the disease, for the mortality in removing the acutely inflamed, non-ruptured appendix is negligible.

Much has been written about appendical peritonitis. Isolated reports have shown improvement in mortality statistics in recent years. Yet there has been no appreciable decline in the mortality from appendicitis throughout the country as a whole in the past twenty years.

The conservative management of appendical peritonitis has never become universally popular since it was first advocated by A. J. Ochsner[4] in 1892. And today it continues to be one of the most controversial subjects of surgical practice. Statistics may be presented either to prove or disprove the advisability of its use. Thus Dr. J. Shelton Horsley and his sons[5] in a series of 95 patients with all forms of appendical peritonitis report a mortality of only 2.1 per cent with immediate operation, while Dr. LeGrand Guerry[6] in 139 patients with diffuse appendical peritonitis has a mortality of 1.4 per cent with deferred operation, and, in a similar group of 94 patients treated by immediate operation, a mortality of 10.6 per cent. Such excellent results are unusual in the literature and stand out as testimonials to the exceptional judgment and skill of their authors, for such results have not been attained by the large majority of the surgeons of the country.

All should agree that operative intervention in the patient with appendical peritonitis is a major procedure and that it should be undertaken only by the experienced and the skillful surgeon. The manner in which the patient is treated cannot be standardized. As Shipley[7] states,

"Each patient is a separate problem and, while certain principles may be followed, there is no better way to keep the death rate high than to treat every case in conformity with some preconceived plan."

Our experience with the conservative regime in appendical peritonitis convinces us that it is based on sound physiologic and surgical principles. With it we have materially reduced our mortality, duration of hospitalization, and incidence of complications in appendical peritonitis. Yet it must be made clear from the start that its management is not simple or easy. That, as Royster[8] quotes Ochsner as stating, "It is not a substitute but a preparation for operation." That *under no circumstances do we advocate the conservative regime for the acutely inflamed, non-ruptured appendix.* That it requires the close supervision of an experienced surgeon with the patient in a well-regulated hospital. And that *the conservative regime is never to be undertaken in the home by the family physician.*

The rationale of delaying operation in cases of appendical peritonitis is based upon the fact that a natural protecting mechanism exists within the abdomen which, if left undisturbed, is

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*Read in Section on Surgery, Southern Medical Association, Thirty-Second Annual Meeting, Oklahoma City, Oklahoma, November 15-18, 1938.

*From the Department of Surgery, Duke University School of Medicine.

usually capable of causing the resolution or localization of appendical peritonitis. This protective mechanism consists of the inflammatory response to the presence of irritation within the peritoneum and is characterized by the outpouring of an exudate which is bactericidal and which contains leukocytes and fibrin. The fibrin agglutinates peritoneal surfaces of bowel, omentum, and abdominal wall in an effort to wall-off areas of inflammation from uncontaminated parts of the peritoneal cavity. This being possible, the bactericidal effect of the inflammatory reaction is sufficient to cause complete resolution of the infection in the majority of properly managed cases. Such a protective mechanism is effective only if left undisturbed, disturbing elements being any factor, such as food or cathartics, which stimulates peristaltic activity in the bowel, or any mechanical procedure, such as operation, either of which may break up the protective barrier of agglutinated peritoneal surfaces and open the uncontaminated peritoneum to infection.

Successful operation of the conservative regime must include a proper selection of cases, careful management of the regime, and skilled judgment in determining when operation should be done.

SELECTION OF CASES

Stage of Disease.—There should be no misunderstanding that delayed operation is reserved only for patients with perforated appendices. Whether or not the appendix has perforated in any given case must be determined individually for each patient after a careful analysis of history and physical and laboratory findings. No definite hour after onset of symptoms can be used as a criterion of perforation. While it is true that in most severe attacks of appendicitis, the appendix is found to be ruptured forty-eight hours or longer after an attack, it is not wise to set an arbitrary hour, such as forty-eight hours after onset, as a dividing line to separate cases requiring immediate or delayed operation. We have seen a patient in whom delayed operation was justified in the first day of the illness and have seen many in whom immediate operation was indicated four or five days after onset of symptoms. It must be emphasized that, if, after careful evaluation of all diagnostic measures, there exists a reasonable question as to whether the appendix is or is not ruptured, immediate operation must be done.

Differences of opinion exist as to which forms of appendical peritonitis should be treated conservatively. Ochsner first advocated his treatment in cases of spreading or diffuse peritonitis. In England, where Sherren[9] first advocated delayed operation in 1905, it has been used largely in cases where localization has already occurred, while patients with diffuse peritonitis, unless moribund, are usually submitted to immediate operation. We have combined these two applications of the conservative regime and now, with certain exceptions, treat by delayed operation all patients in whom a definite preoperative diagnosis of perforated appendicitis can be made, regardless of the stage of the peritoneal infection in which the patient is first seen. Our experience (*Table 1*) has been largest in patients

Table 1

ANALYSIS OF ALL CASES

1930-38	Immediate Operation		Conservative Regime	
	No. Cases	Deaths	No. Cases	Deaths
Non-acute*	776	0	0	0
Acute†	874	1	0	0
Total non-ruptured	1650	0.06 Per Ct.		
Local peritonitis	83	6	23	1
Abscess	83	8	79	5
Diffuse peritonitis	40	18	9	3
Total ruptured	206	15.5 Per Ct.	111	8.1 Per Ct.

*Not including appendices removed at laparotomy for another condition.

†All verified by microscopic section, including acute diffuse, suppurative, thrombotic and gangrenous appendicitis.

with inflammatory masses present on admission. Only nine patients with diffuse peritonitis have been treated conservatively. One of these entered the hospital in the twenty-fifth hour of her illness with signs of generalized peritonitis, maximum in the pelvis, thought to be coming from a salpingitis. Placed on the conservative regime, she seemed to improve, although her temperature and pulse did not fall and she died on the fifth day of generalized peritonitis. This case, early in our experience, corroborates the observations of Alton Ochsner[10] and has convinced us that expectant treatment is unwise in the presence of early perforation of the appendix and widespread signs of peritonitis. Such a situation, we now feel, represents the only major contraindication to the use of delayed operation.

Age of Patient.—A. J. Ochsner recognized early in his experience that delayed operation was not borne well by the very young or the very old. Aged patients, he emphasized, do not stand confinement to bed well, while in small children the omentum is not sufficiently developed to act as a protection. This opinion has been modified by Alton Ochsner[10] who recommends the conservative regime in children in whom localization of the peritoneal infection is beginning. And more recently it has been reversed by the experience of Coller and Potter[11] at the University of Michigan, and Adams and Bancroft[12] at the University of Minnesota, who have found the use of delayed operation advisable in children with diffuse as well as localized appendical peritonitis.

It is our present practice to treat all forms of appendical peritonitis in children conservatively, although formerly we used delayed operation only in children in whom localization of the infection was beginning when the patient was first seen. We have used the conservative regime in 26 children (*Table 2*) with three

Table 2

AGE DISTRIBUTION ACCORDING TO TREATMENT SELECTED. ALL CASES OF PERFORATED APPENDICITIS

Age	Immediate Operation		Conservative Regime	
	No.	Mortality Per Ct.	No.	Mortality Per Ct.
1-15	76	21	26	11.5
16-50	115	11.3	68	4.4
51+	15	20	17	17.6
Total	206	15.5	111	8.1

deaths. Seven of these had a generalized peritonitis on admission. Eighteen of the 26 subsided completely and were discharged without operation to return in three months for appendectomy. Of these, 16 either entered with or developed palpable masses which subsided under the regime. Seven formed abscesses which failed to subside and were drained. Of these, two died, one of peritonitis and the other of a subphrenic abscess. One child, who was practically moribund on admission with a diffuse peritonitis, died without operation.

We have not hesitated to use the conservative regime in the aged. Although the mortality in this group is higher than for any other age (*Table 2*), it is still lower than that for immediate operation.

Previous Catharsis.—The recent ingestion of cathartics has been stated by Bailey[13] to be a justifiable reason for not using the delayed treatment. It is our feeling that such catharsis represents a hazard equally dangerous if immediate operation be undertaken and we have rarely been influenced by a history of catharsis during the attack. Of our 111 cases treated conservatively, 54 or 48 per cent had had catharsis.

Question of Diagnosis.—When a definite differential diagnosis between perforated appendicitis and some other intra-abdominal catastrophe which requires immediate operation cannot be made, immediate operation should be done. If, on the other hand, the alternative condition suspected does not require immediate operation, indication for delayed operation is all the more certain.

Pregnancy.—Coller and Potter[11] urge that the delayed form of treatment never be used in pregnant women, saying that the presence of the enlarged uterus prevents localization of the infection. Bailey,[13] on the other hand, says that the presence of pregnancy should not influence one in the selection of suitable cases for delayed operation. We have no experience with this condition.

Facilities for Care.—It must be emphasized that the conservative treatment of appendical peritonitis is not a substitute for operation, but a preparation for it. It is not to be undertaken in the home or by the family doctor, but in a hospital, "on the threshold of the operating room"[13] under the constant eye of the surgeon who is to operate at any hour if necessary. Adequate care can be given satisfactorily in any modern hospital with a trained nursing staff. However, if the surgeon is not so situated that he can visit his patients personally at least three times daily and be prepared to respond at any hour if called, the delayed form of treatment should not be undertaken.

MANAGEMENT OF CONSERVATIVE TREATMENT

Once a patient is selected for the delayed operative treatment, the following regime is outlined:

Fowler's Position.—The patient is kept in bed in Fowler's position with the head of the bed elevated on six-inch blocks.

Nothing by Mouth.—Although Sherren[9] and his followers in England allow water by mouth, we are convinced of the wisdom of Ochsner's

original plan and give absolutely nothing by mouth during the early days of the treatment.

Parenteral Fluids.—A fluid intake of 2,000 to 4,000 c. c. is maintained daily by divided intravenous injections, subcutaneous infusion, or continuous intravenous infusions. Fluids are not administered by rectum nor are large enemas given. Care must be taken that the electrolytes of the blood are not depleted, particularly if constant siphonage of the stomach is maintained.

Gastric Lavage.—If the patient has been vomiting, has eaten recently, or if he is distended, the stomach is washed. If duodenal content is recovered, continuous siphon drainage of the stomach is maintained, using the method of Wangensteen until such drainage stops.

Sedation.—It has been our experience that opiates are seldom necessary. The occurrence of pain during treatment usually indicates that the appendix is not ruptured, that an abscess under tension is present, or that the intestinal tract is overloaded. Opiates are used only to allay restlessness or apprehension. We have not used large doses of morphine to increase intestinal tone.

Special Observation.—As soon as the patient is admitted, the extent of abdominal signs is carefully recorded on his chart. If he enters with a palpable inflammatory mass, its exact size is drawn on the abdominal wall with gentian violet. In addition, a special bedside nursing chart is kept on which the nurses record the rectal temperature every two hours, the pulse every hour, and the occurrence of vomiting and pain, as well as the fluid intake, nature and amount of stomach drainage, if any, the urinary output, and the passage of flatus or feces.

CLINICAL COURSE UNDER CONSERVATIVE TREATMENT

There are several possible courses which may be followed by the peritoneal infection under conservative treatment (*Fig. 1*). They are:

(1) The entire inflammatory process may disappear by resolution. This occurred in 89, or 80 per cent, of our 111 cases treated conservatively.

(2) The inflammatory process may become localized in the right iliac fossa or in the pelvis, forming a palpable inflammatory mass. Such a mass (a) may then resolve, (b) may fail to resolve or actually increase in size and necessitate drainage, or (c) may rupture into the peritoneal cavity, the bowel, or the retroperitoneal tissues.

(3) The inflammatory process may continue to spread and the patient may succumb to a generalized peritonitis. This occurred in 2, or 1.8 per cent of the cases treated conservatively.

One must be on the alert for the development of any of these possibilities and if indication of continued spread of the peritoneal infection or of increase in size or rupture of an abscess occurs, immediate operation must be done.

Resolution of the Peritoneal Infection.—In the majority of patients under the conservative regime of treatment, resolution of the peritoneal

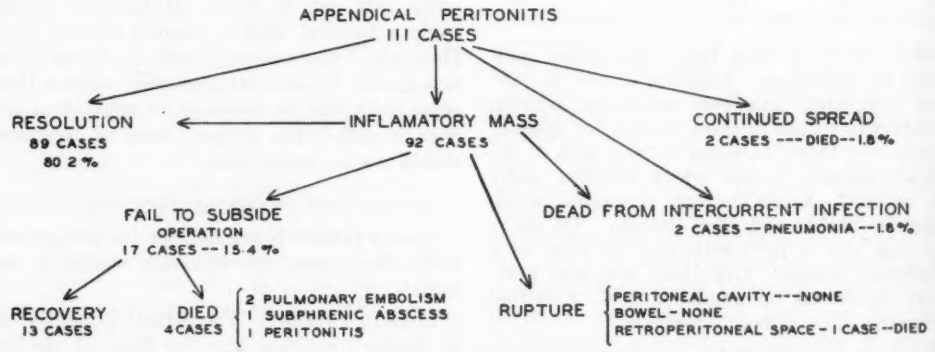

Fig. 1

Diagram showing the course followed and the result in 111 cases of appendical peritonitis treated conservatively. The 111 cases include 9 with diffuse peritonitis, 23 with local peritonitis and 79 with palpable masses. Of the 89 in whom symptoms and signs subsided completely, 66 entered with palpable masses, 19 with local peritonitis and 4 with general peritonitis. Of those which subsided, 6 of the 19 with local peritonitis and 2 of the 4 with general peritonitis developed palpable masses during the course of treatment. These masses resolved spontaneously. Of the 17 cases which failed to resolve and in whom operation became necessary, 3 entered with diffuse peritonitis, 2 with local peritonitis and 12 with palpable masses.

infection occurs and improvement in the general condition is observed from the start. Vomiting and pain stop, dehydration is overcome, abdominal distention is lessened, tenderness and rigidity of the abdominal muscles decrease, and the temperature and pulse gradually fall.

The temperature usually subsides slowly and in our experience approximated normal in an average of seven days (*Chart 1*). Maintenance of an elevated temperature in itself for a few days need not be considered abnormal. The pulse usually falls before the temperature (*Chart 1*). A rising pulse is one of the most important single signs of trouble and usually indicates that the delayed treatment should be abandoned.

If the clinical course progresses satisfactorily, the patient is kept on nothing by mouth until the temperature approximates normal, all distension has disappeared, and he is free of discomfort. Water in amounts of 30 c. c. hourly is then started. If this is not accompanied by abdominal discomfort or rise in temperature, similar amounts of clear liquids are given on the following day. This is gradually increased and a soft diet is allowed after five or six days. As feedings are started, the nursing chart, symptoms, and abdominal signs are watched closely for evidence of a flare-up in the inflammatory process. If at any time abdominal discomfort, increase in abdominal signs, or recurrence of tachycardia or fever appears, all fluid intake by mouth is stopped. If signs do not then subside promptly, operation must be done. If it is necessary to keep a patient on nothing by mouth for longer than four or five days, as is often the case, transfusions of 500 c. c. of citrated blood are given at one- or two-day intervals. None of our patients undergoing conservative treatment has developed nutritional edema, although we occasionally have seen this in postoperative patients with peritonitis, in whom feeding by mouth has been withheld for a long period of time.

Abscess Formation.—The patient may enter the hospital with a palpable inflammatory mass or one may develop while he is under treatment. It is surprising how often large inflammatory masses will disappear completely under the conservative regime of treatment. Such was the case in 73, or 80 per cent, of the 92 patients who either entered with or developed inflammatory masses while under conservative treatment.

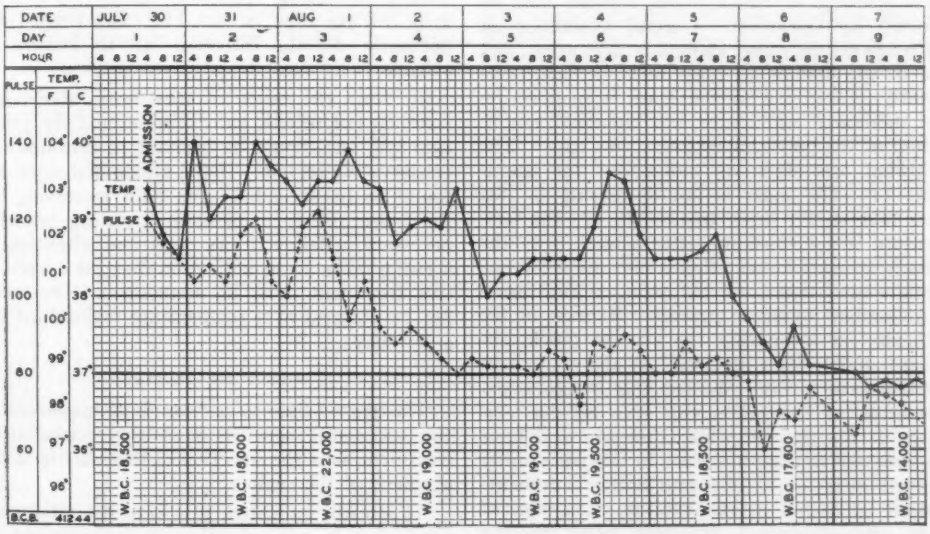

Chart 1

The temperature chart of a typical case with appendical peritonitis treated conservatively. The average temperature on admission of the first 60 cases treated conservatively in whom resolution of the infection occurred was 102° F. and the average pulse 110. The average duration of fever was seven days. The patient whose chart is shown was a boy 14 years of age who entered with symptoms of three days' duration and with signs of peritonitis in both lower quadrants and in the pelvis. On the second and third days an indefinite mass was found in the right lower quadrant. It could not be felt after the fourth day. Abdominal tenderness had disappeared by the sixth day. Water was given by mouth on the sixth day and clear liquids on the seventh. He remained in the hospital 15 days, the temperature being normal after the eighth day.

Sworn and Fitzgibbon[14] report 81 per cent of 367 cases to have subsided, 13 by evacuation into the bowel. Love[15] reports 68 per cent of 341 cases and Adams[16] 67 per cent of 214 cases as subsiding completely under the conservative regime.

About 20 per cent of inflammatory masses will not subside and will form abscesses which must be drained. That such an abscess may rupture into the peritoneal cavity must be remembered by all who practice delayed operation. In our series of 92 patients who developed inflammatory masses, 17, or 18.4 per cent, did not subside and were drained at operation, the appendix not being removed in any of these cases. None in our experience has had an abscess rupture into the peritoneal cavity or into the bowel. A patient admitted one month after onset of symptoms died thirty-six hours after admission with a large retroperitoneal abscess. Another died of pneumonia on the eighth day of the treatment. Autopsy showed a small, inactive abscess in the right lower quadrant which did not contribute directly to the patient's death.

Close observation of patients with inflammatory masses undergoing the treatment must be maintained so that those with abscesses which need drainage or which might rupture may be selected for operation. Careful evaluation of the temperature, pulse, abdominal symptoms, and size of the abdominal mass must be made frequently. The size of the mass is mapped on the abdominal wall daily and bimanual examination of the pelvis made every two days. The following are taken as indications for operation: (1) The mass is not decreasing in size after four or five days' treatment; (2) the temperature is not subsiding after a week; (3) the mass is growing larger (this is indication for immediate operation); or (4) pain, as contrasted to abdominal soreness, appears. Because of the difficulty in estimating the size of pelvic abscesses, Bailey does not treat an abscess in this position expectantly. We feel that bimanual examination of the pelvis can give reliable evidence of the size of pelvic abscesses and have not hesitated to treat abscesses in this position by delayed operation. Coller and Potter [11] draw attention to edema of the genitals as a sign of large intra-abdominal abscesses under tension which require immediate operation. They also feel that a return of elevation in leukocyte count after a preliminary fall during treatment indicates the presence of an abscess.

None of our patients has had an abscess which ruptured into the peritoneal cavity while under conservative treatment, although Bailey[13] reports such a catastrophe. His patient, aged 11 years, seemed to be progressing satisfactorily although the abscess was not decreasing in size. On the fifth day he suddenly collapsed and showed signs of general peritonitis. Immediate operation was done, drainage was instituted locally and suprapubically, and the patient recovered. Jopson and Pfeiffer[17] report three patients with perforation of an appendix abscess into the free peritoneal cavity, although none occurred in patients hospitalized under the conservative regime. All had had sudden exacerbations of their abdominal symptoms with evidence of a violent peritonitis. Two had also shown evidence of circulatory collapse at the time of the rupture. Operation was done in one case two days after rupture, in another after twelve hours, and in the third in four or five hours. Only the last patient survived. They emphasize that when an abscess perforates into the free peritoneal cavity immediate operation is imperative.

Continued Spread of the Peritoneal Infection.—The process of inflammation within the abdomen may fail to limit spread of infection from a perforated appendix. However, in only 2, or 1.8 per cent, of our 111 cases treated expectantly did the infection fail to localize or subside.

If, from the onset of treatment, abdominal signs do not recede, pain subside, and the pulse rate fall, one should be hesitant to continue the conservative regime. If the abdominal signs are found to be spreading, the pain increasing, or the pulse rising, immediate operation becomes necessary. Bailey draws particular attention to a rising pulse as an indication that the conservative treatment must be abandoned. One need not be alarmed at a temperature maintained for a few days.

WHEN TO OPERATE

The proper time to operate is as important in the successful conclusion of the conservative treatment as is the selection of cases or the management of the regime.

As already indicated, if a localized inflammatory mass is not subsiding or is increasing in size, if an abscess ruptures into the peritoneal cavity, or if continued spread of the peritoneal infection occurs, immediate operation should be done. Fortunately, except in the case of a small percentage of inflammatory masses which do

not subside, it is unusual for appendical peritonitis not to resolve spontaneously under a properly managed regime of treatment as outlined.

When, then, should operation be done in the case where the infection is subsiding satisfactorily? Some delay operation only until the peritonitis shows evidence of localizing; others operate as soon as the acute inflammation has subsided, which is usually after eight to ten days of the treatment; while still others wait two or three months after the attack before removing the appendix in an interval stage. We follow the latter form of treatment. Operation in the presence of recent peritoneal infection is too often complicated by the presence of free pus or by such a mass of adhesions as to make the procedure extremely difficult and hazardous. On the other hand, we have never failed to express surprise at the relative absence of adhesions and the ease of the operative procedure when the appendix is removed three months after the attack.

RESULTS OF DELAYED OPERATION

Mortality.—It is the experience of all who have used the delayed form of operative treatment in appendical peritonitis, as outlined, that the mortality rate is significantly reduced. Our eight-year experience with perforated appendices is divided into two periods (*Table 3*). From

Table 3

ANALYSIS OF ALL CASES OF PERFORATED APPENDICITIS SHOWING IMPROVEMENT IN MORTALITY RATE IN THE PERIOD JULY, 1934–JULY, 1938, WITH CONSISTENT USE OF THE CONSERVATIVE REGIME

	July, 1930-July, 1934		July, 1934-July, 1938	
	No.	Mortality Per Ct.	No.	Mortality Per Ct.
Local peritonitis	40	10	66	4.5
Abscess	63	14.3	99	4.0
General peritonitis	19	47.4	30*	40.0
Total	122	18	195	9.7

*The conservative regime was not used in children with general peritonitis prior to July, 1937.

1930 to 1934 delayed operation was not used in the early years and in the latter ones only occasionally. This series numbered 122 patients. In the period 1934 to 1938, which includes 195 cases, delayed operation was used in all patients when indicated. The mortality rate in the latter period, 9.7 per cent, was almost one-half that of the 18 per cent of the first period. This reduction was accomplished mainly in the groups of local peritonitis and abscess, where the mortality fell from 10 per cent to 4.5 per cent and from 14.3 per cent to 4 per cent respectively.

Guerry[6] in 1936 reported an operative mortality of 1.4 per cent in 139 cases of diffuse peritonitis treated by delayed operation in contrast to a mortality of 10.6 per cent in 94 similar cases treated by immediate operation. Deaver and Magoun[18] report a mortality of 10.5 per cent for all cases with acute appendicitis treated between 1901 and 1905. In the period 1910 to 1914 this fell to 3.7 per cent and between 1915 and 1919 to 4.2 per cent, a reduction which they attributed to the delayed form of operative treatment used in the latter periods. Coller and Potter[11] report a mortality of 9.4 per cent in 87 cases of spreading peritonitis occurring in patients of all age groups treated by delayed operation. Adams and Bancroft,[12] in a series of 110 children, 67 of whom had generalized signs, report a mortality of 4.5 per cent during the conservative regime of treatment. Walker[19] reports a mortality of 13 per cent in 30 cases of generalized peritonitis treated conservatively in contrast to a mortality of 42 per cent in 77 cases treated by immediate operation. Stanton[20] reports 113 cases with well-marked evidences of peritonitis. In 31 with immediate operation the mortality was 42 per cent while 82 were treated by delayed operation with a mortality of 8.5 per cent. Bunch and Doughty,[21] in a series of 512 cases of perforated appendicitis treated conservatively when indicated, report a mortality of 9.5 per cent.

Bailey[13] in 242 cases of all forms of acute appendicitis treated by immediate operation, had a mortality of 1.6 per cent. Of 73 cases with appendical peritonitis treated conservatively, the mortality was 1.3 per cent. Sworn and Fitzgibbon[14] report 487 cases of perforated appendices with palpable mass. One hundred and twenty were operated upon immediately and 69 after a preliminary delay with a mortality of 7.9 per cent. In 298 conservative treatment was used and no operation done at the time with a mortality of 0.68 per cent. Love[15] reports 341 cases of local peritonitis and abscess treated conservatively with a mortality of 3.5 per cent. Immediate operation was done in 1,044 cases of all forms of appendical peritonitis with a mortality of 8.8 per cent. Adams[16] in a similar series reports a mortality of 4.2 per cent in 214

cases treated conservatively and 13.2 per cent in 553 cases treated by immediate operation.

Complications.—In our series of 89 patients in whom complete resolution of the peritoneal infection occurred without operation, complications developed in 5*, or 5.6 per cent of cases. In the series of 174 who survived immediate operation, complications were present in 36, or 20 per cent. Sworn and Fitzgibbon[14] report 17.1 per cent complications in their group of appendix abscess cases with operation and 6.7 per cent with conservative treatment.

None of our cases has developed subphrenic abscess or pylephlebitis while under the conservative treatment. Bailey states that subphrenic abscess is almost unknown and that the pylephlebitis does not occur under delayed operative treatment.

Duration of Hospitalization.—In patients with appendical peritonitis who survived treatment by immediate operation, the average hospital stay was 26.2 days. In those whose symptoms subsided completely under the conservative regime, it was 15.5 days. In the survivors of the group who formed abscesses which required drainage while under treatment, the average period of the entire hospitalization was 29.5 days. The average period of hospitalization for the entire series which survived the conservative regime was 17.3 days.

SUMMARY AND CONCLUSIONS

The conservative management of appendical peritonitis is based on sound physiologic and surgical principles. It may be used in all forms of appendical peritonitis regardless of age except in the presence of early perforation of the appendix with widespread signs of peritonitis.

Delayed operation is not to be practiced in the treatment of the acutely inflamed non-ruptured appendix. It must be used only in the hospital under the constant supervision of a surgeon and is never to be practiced in the home by the family doctor.

Management of the treatment requires absolute rest of the intestinal tract, maintenance of an adequate fluid, mineral, and caloric intake by routes other than by mouth, and careful observation for evidence of continued spread of a peritonitis or increase in size or rupture of an abscess in which case immediate operation becomes necessary.

Of 111 patients with appendical peritonitis treated conservatively, 89, or 80 per cent subsided completely in an average of 15.5 days and were discharged to return for interval appendectomy in three months. Seventeen cases failed to subside and formed abscesses which were drained on an average of 9 days after admission.

The entire series of 317 cases with perforated appendices admitted to the surgical service of the Duke Hospital from its opening in July, 1930, to July, 1938, is divided into two periods. In the first four years when almost all cases were treated by immediate operation, the mortality in 122 patients was 18 per cent. In the second four years, with consistent use of delayed operation in all patients in whom a definite preoperative diagnosis of a perforated appendix could be made the mortality was 9.7 per cent. In the entire series the mortality by immediate operation was 15.5 per cent and under the conservative regime 8.1 per cent.

The complication incidence in survivors of delayed operation was 5.6 per cent and of immediate operation 20 per cent. The average period of hospitalization of survivors of immediate operation was 26.2 days and of the group treated by delayed operation 17.3 days.

This reduction in mortality, incidence of complication and duration of hospitalization in patients with appendical peritonitis treated by delayed operation justifies the more widely accepted use of this form of treatment.

*Four had recurrence of inflammatory signs and one intestinal obstruction. All subsided with continuation of the conservative regime.

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DISCUSSION (*Abstract*)

Dr. LeRoy Long, Oklahoma City, Okla.—For many years we have been convinced that, in the case of the average patient, advanced peritonitis resulting from perforation of the appendix ought to have conservative, non-operative management.

We do not believe that operation should be considered if there is a distinctly palpable mass in the appendical region before evidences of suppuration. Such a mass is generally not demonstrable until several days after the initial appendicitis, at which time it is regarded as obvious evidence of localization in the presence of advanced disease.

We believe that the mass disappears occasionally by new tissue formation and fibrosis, the usual mode of recovery of an inflamed area produced by typical pyogenic organisms; and that it disappears sometimes by invading a contiguous portion of the intestinal tract, the resulting abscess draining into it, but, in our experience, the percentage of disappearance of the mass without suppuration is not nearly so high as that indicated by the contributor.

In general, we are in complete agreement with the essential details of conservative management, as indicated by Dr. Gardner in his exhaustive and excellent contribution, that is, nothing by mouth or rectum, parenteral administration of physiologic sodium chloride solution and dextrose solution (the latter always intravenously), gastric lavage and suction drainage as necessary; and sedatives as necessary.

Touching postural management, we suggest the uninterrupted right lateral position of the patient in bed, with the pelvis drawn backward so that there is slight inclination forward of the body, combined with moderate Fowler's position, because it promotes the retention and localization of toxic material in the area of major disease.

We believe very firmly that the hypodermatic administration of morphine or some equally potent derivative of opium should be employed to the extent necessary to keep the patient comfortable in body and mind.

Because of the inhibition of peristalsis behind a contracted external anal sphincter, a voluntary muscle with peripheral innervation, we strongly advise that the end of a colon tube (not a catheter), or a like tubular device, be introduced into the rectum for a few inches beyond the external sphincter, and left there for a large part of the time, thus promoting the escape of gas.

We regret that we have to disagree with the statements that evidences of a "continued spread of peritoneal infection" and a "rising pulse" are indications that conservative management should be abandoned. In our judgment, there is but one time when it is logical to come to a decision between operative and non-operative management, and that is when the management is begun. Bearing in mind the pathologic and physiologic phenomena associated with advanced appendical peritonitis, we believe that operation during conservative management should be limited to the drainage of localized purulent accumulation and, sometimes, an emergency enterostomy for the relief of intestinal incompetence, an operation not required very often now because of other means for intestinal decompression. Otherwise, the die is cast when the method of management is first chosen.

For the reasons advanced by Dr. Gardner, the statement that an appendectomy should not be done until around three months after the subsidence of an appendical peritonitis has our definite approval.

Up to this point we have discussed the management of *advanced* appendical peritonitis. Now, in an effort to be frank and fair and as logical as possible, we wish to express the belief that there is no adequate pathologic or physiologic reason for conservative, non-operative management in the case of every patient who shows evidence of perforation of the appendix. The only exception mentioned by the contributor is where there are evidences of perforation, with a rapidly spreading peritonitis. We wonder if this position is consistent, because we believe that in such a situation conservative management ought to be employed.

It is heartily agreed that the elapsed time, considered alone, does not justify a surgical operation. Conversely, we are convinced that the elapsed time, within the early hours, considered alone, does not always justify non-operative management. If there are evidences of collapse, operation should not be done, regardless of elapsed time. On the other hand, if the pulse is of good volume, with a rate corresponding to the temperature, if the skin is hot and dry, and if it has not been longer than around 36 hours from the initial symptoms and signs of appendicitis, in such a situation we believe that operative treatment should receive careful and unbiased consideration, with the understanding that if an operation is done, there should be adequate drainage, and that the immediate postoperative management should be exactly the same as that employed for appendical peritonitis without operation.

Finally, remembering that we are discussing a subject of superlatively vital importance, we should not take a position that is too dogmatic, one way or the other. Rather, let us heed the biblical injunction: "Come now, let us reason together."

Dr. J. A. Crisler, Jr., Memphis, Tenn.—Reports based on a clinical study of a series of cases are always in-

formative and of great practical value. They not only determine the actual results of a method of treatment, but they also correct certain clinical impressions which are too often based on memory instead of on facts and statistics.

Dr. Gardner's presentation was excellent and his subject of vital interest to all of us. He has shown that at Duke University deferred operation for appendical peritonitis has reduced the mortality of this condition by approximately one-half and that his results are strikingly similar to those of Coller, Ochsner, Adams and others who have reported on this method of treatment.

He has emphasized that the conservative treatment is not advocated for the non-ruptured appendix; that it is not to be carried out in the home; and that the cases must be properly selected and constantly observed while being subjected to this type of treatment. This is sound judgment.

Certain limitations of the conservative management are called to our attention: first, that the diagnosis must be certain as to whether the appendix is ruptured. Second, if an alternative diagnosis arises that the other condition does not in itself require immediate operation.

Third, that conservative treatment is contraindicated in the presence of early perforation of the appendix with signs of widespread peritonitis. This point seems somewhat inconsistent.

Fourth, that the delayed treatment should be abandoned in the presence of a rising pulse, of continued spread of the peritoneal infection (1.8 per cent) of increase in size of the abscess, or of rupture of the abscess. In other words, if the clinical course does not progress satisfactorily, operate.

Lastly, if the inflammatory mass does not subside (as in 20 per cent of his cases), drain the abscess.

In some respects these limitations seem to detract from the principle of conservative treatment, but, in my opinion, they simply emphasize the importance of sound clinical judgment which decries the arbitrary selection of cases as well as the blind following of a preconceived plan.

I was particularly impressed with the very high percentage (80 per cent) of his cases which subsided completely.

We have followed the principle of deferred operation only in certain cases and not as a routine. Each case is considered individually, but in general those patients admitted with signs of widespread peritonitis, distended or silent abdomen and rapid pulse are treated conservatively. Likewise, cases with palpable inflammatory masses are not operated on immediately. Instead, operation is postponed until the infection is localized. Then the abscess is drained and the appendix is removed, provided it can be reached without breaking down the walls of the abscess.

In fourteen cases the abscess was drained and the appendix was not removed, but only six of these fourteen returned later, as requested, for removal of the appendix. Of these six cases, three returned with another attack of appendicitis, and at operation the tissues were almost as indurated as when the abscess was first drained. It is this sort of experience that has prevented our waiting for complete resolution before operating on localized abscesses. Furthermore, we have felt that after localization of an abscess, we could cure these patients by operation at this stage, whereas further delay might permit the development of such complications as rupture of the abscess or metastatic spread of the infection. According to the essayist such complications are very rare and our fears are more imaginary than real, so I intend to try further delay of operation on this type of case, not with the idea of lowering our mortality, but with the hope of shortening the hospitalization time from our present average of about three weeks after operation to approximately two weeks for the essayist's cases. With this in view, I should like to ask Dr. Gardner: what is the correct interval treatment? And how does one induce these patients to return, especially to return before they have another attack?

In order to submit some sort of statistical evidence, I reviewed the last 100 consecutive cases of appendical peritonitis occurring in our private patients. There was an incidence of approximately one case in five of acute appendicitis admitted with peritonitis. There were 4 deaths, or a mortality of 4 per cent. Three of these deaths occurred in children. Two of the 4 patients who died were not operated upon, but probably would have died under any method of treatment. None of the operated cases was closed without drainage. There were no cases of pregnancy in this small series, but I can recall two cases with ruptured appendices occurring during well advanced pregnancy that were operated upon immediately. Both recovered without miscarriage after a very stormy convalescence.

Dr. Jere L. Crook, Jackson, Tenn.—It fell to my lot to be closely associated with the late Dr. J. B. Murphy at the time when the great "war" between Murphy and Ochsner was in progress, Dr. Murphy, as all of you will recall, advocating immediate operation for every case of appendicitis that came to the hospital regardless of the time and duration of the disease, and Dr. Ochsner advocating the so-called "Ochsner treatment" of delayed operation, the Fowler position, the Murphy drip and absolute starvation.

Having an annual pass on the Illinois Central Railroad, I frequently spent Saturdays at Dr. Murphy's or Dr. Ochsner's clinics. I soon became convinced of the feasibility of Dr. Murphy's position and have never had cause in my own experience to change my opinion.

This "war" of opinions and methods of treatment brought about a great division in the medical profession of America, the medical men taking sides with Dr. Ochsner and the surgeons almost unanimously agreeing with Dr. Murphy. The misconception which arose in the minds of the profession regarding Dr. Ochsner's treatment undoubtedly was a great misfortune, as it caused the public to feel that there was a medical as well as a surgical treatment for this ailment.

Those who were fully cognizant of Dr. Ochsner's method knew that it was his advice to treat each case through the acute period and invariably operate at a safe time later. As a matter of fact, however, thousands of persons who were treated by his method refused to come back for operation, and hence laid themselves

liable to other attacks, either one of which might prove fatal.

The paper to which we have listened is a resurgence to the Ochsner treatment and according to the statistics presented by the essayist he is unable to prevail upon his patients, whom he carries through the acute peritonitis stage, to return for subsequent operation, a comparatively small number having come back.

As another practical objection to the delayed operative treatment the hospital expenses are very greatly increased and those who have undergone three or four weeks' hospitalization while their appendices are being "frozen out" are "broke" and are unwilling to return unless necessity forces them to do so.

If one reads Murphy's addresses and papers on the subject and follows his mortality statistics, I do not see how he can fail to agree with him. Standing by his side repeatedly in the operating room at Mercy Hospital, I have noted the marvelous skill, dexterity and rapidity with which he made a simple incision in the right lower quadrant, slipped in a tube, with no disturbance of the viscera, leaving the patient to be returned to his bed and placed on his side with the tube simply acting as a spout to allow the overburdened peritoneal cavity to empty the pus on the dressings rather than to place upon the patient the job of absorbing this pus and eliminating it through the various emunctories of the system.

In my Presidential Address at the Hot Springs meeting of this Association I used the subject of "Appendicitis Mortality" as the keynote, emphasizing the obligation resting upon the surgeons of America to teach the people that the inexcusable mortality from this disease is due almost entirely to delay in seeking a surgeon's care and to the use of purgatives before the surgeon sees the patient.

At the meeting of the Surgical Section in Baltimore I introduced a resolution, which was unanimously adopted, to have the subject of appendicitis mortality discussed at periodic intervals over the entire country before the public, over the radio and in public addresses. When we can place the impact of the entire membership of the Southern Medical Association on the vital problems which produce mortality, we shall certainly get good results.

Surgeons should forget their false pride and fear of criticism and lose no opportunity to teach the public the nature and proper treatment of this disease.

Finally, let me quote from an address previously delivered:

"The only tribunal before which we can justly be arraigned is the bar of mortuary statistics. That is where we are to be tried, and if we do not lengthen human life and lessen suffering and inculcate a better standard of excellence than our predecessors, then we stand convicted before this tribunal. So I claim when we use our opportunities to *teach;* when we carry out the suggestion in the title of *doctor,* which the public gives us, we will be accomplishing the greatest good for humanity and will thereby approach nearer to the ideals toward which we are striving."

Dr. M. Pinson Neal, Columbia, Mo.—The mortality rate from rupture, gangrene and peritonitis, the common complications of appendicitis that ride in the saddle with procrastination, purgatives and pain-relieving drugs, is and always will be high. It must be our aim, as practitioners, to treat the disease and not its complications. There is only one therapeutic measure for acute appendicitis: surgery, and somebody bears the responsibility of conveying that information to the patient early, or preferably to the individual before he has need for it. No treatment now or ever can compensate for delayed diagnosis or delayed surgery.

In Missouri, under the sponsorship of the State Medical Association, a group of interested physicians has been carrying on for the last eighteen months an intensive program intended to educate the public to its responsibilities and re-emphasize to the members of our profession their obligation in the disease appendicitis. This has been carried on especially among school children rather than trying to reach busy and more or less disinterested parents. Three of us have taken this message in a somewhat dramatized way out into the State to over 40,000 children between the ages of 10 and 20, the impressionable age. They are told in simple language that no one ever has appendicitis without pain; that in the presence of acute abdominal pain of two hours' duration (or if it is very severe within a shorter period) a physician shouuld be called; that he knows how to handle the sick appendix and his advice should be followed; that while awaiting the arrival of the physician the patient should obtain complete rest in bed; should take nothing by mouth, neither drug, food nor drink; that purgatives, physics and laxatives are not under any circumstance to be taken or given; that neither cold, as ice caps to freeze, heat, as hot water bottles to cook, nor poultices to soothe, are to be applied to the sick stomach; and that relief or cure is not to be expected by self-treatment. Emphasis is made upon the fact that abdominal pain may not be caused by appendicitis, that there are other pains, some of which are physiological in character, but that any pain anywhere in the belly that lasts two hours calls for investigation and interpretation by a physician, and that such pain must not be modified by drugs, heat or cold. It is easy to convey to such an audience that there is no prevention for appendicitis, that one cannot run away or hide from, be vaccinated against, or receive a prophylactic hypodermic injection to ward it off or to cure it.

In the rural districts or small towns during a day one speaker frequently will address as many as six and a team 15 to 20 school audiences. Following such activity in a district a night meeting is held and the physicians of the area are invited for a discussion on the same subject. The time-old story of the signs, symptoms, indicated laboratory examinations, diagnostic criteria, the importance of time, early operation, the necessity of avoiding the use of pain-relieving drugs and of purgatives, foods and fluids by mouth is emphasized and the doctors are told of the message given to the school children and urged to take their place in this program and to be ready to render immediate service when called by a patient who has a pain in the belly. This may be called "the midnight heroics of surgery," but it is the only way to eliminate the cause of, and need for

treating, the killing complications of this disease. Lay and medical education on appendicitis is the need.

Will the essayist kindly give his experiences in patients with appendicitis having a leukopenia and those who show preoperative chills? In our group of something over 2,000 cases, those who have a leukopenia give a very high mortality rate, and those who suffer preoperative chills almost invariably die if submitted to surgery because the chill indicates either blood stream infection, an acute hepatitis, or a phlebitis, commonly of the mesenteric group.

Dr. H. A. Gamble, Greenville, Miss.—It appears from the discussion today that I am almost alone as an advocate of the operative treatment of appendical peritonitis.

The pendulum swings backward and forward. When I first began the practice of surgery it was the operative versus the non-operative treatment of appendicitis; again today it is the operative versus the non-operative treatment of the ruptured appendix. I have given a thorough trial to the non-operative treatment of these conditions with results which were, to say the least, unsatisfactory.

The open treatment of appendical peritonitis is based upon sound surgical principles and pathologic facts.

(1) In 98 per cent of all cases anaerobic organisms are to be found.

(2) With the removal of the offending organ and drainage of the peritoneal cavity the peritoneum quickly returns to a normal condition.

(3) If the abdominal wound is left open there is no incubator-like space left for the development of anaerobic organisms.

(4) Open air is the best specific which we have for the prevention of the growth of anaerobes.

In the 129 cases reported at the St. Louis meeting of the Southern Medical Association there was 1.5 per cent mortality.

Dr. Gardner reports today a mortality rate of 8 per cent. I believe that if he would adopt consistently the open treatment of peritonitis with the other measures incident thereto, the maintenance of the water level of the body, blood transfusions, gastric decompression and enterostomy when indicated, he could reduce this 8 per cent mortality very materially.

Dr. Gardner (closing).—I am very glad that Dr. Long has entered a plea that our attitude toward such a vital problem be not too dogmatic. There can be no doubt that there is no better way to keep the mortality high in appendical peritonitis than by treating all patients according to a preconceived plan. Perhaps the discussion does seem didactic, and to those of you whose experience carries back to the very beginning of this controversy, the paper perhaps is distasteful, coming as it does, as Dr. Crook points out, from one who was not even born when the issue was first raised. Yet, because misunderstanding of the regime has been one of its greatest handicaps, it seems wise to describe certain definite rules which we have followed in principle. That they should be followed blindly, without judgment, is not our contention.

Dr. Long is probably correct in pointing out an inconsistency in our statement that the regime should be abandoned if evidences of continued spread of the peritoneal infection occur while the patient is under treatment. However, we have not had the courage to withhold operation when a patient was not progressing satisfactorily without it.

Dr. Long's use of the continuous rectal tube and the right lateral position of the patient in bed seem logical and we shall make use of them in the future.

Dr. Crisler has called attention to the recurrence of acute inflammation in the appendix during the interval between subsidence of symptoms under the conservative regime and return for interval appendectomy. In our series of 89 patients in whom symptoms subsided completely, 4 returned with signs of a recurrent acute infection. All subsided under another course of the conservative regime.

Dr. Crisler asks of our success in inducing patients to return for interval appendectomy before another attack occurs. On discharge, patients are asked to return for appendectomy in three months. If they do not, they, their family physician, and their local social service agency are all written to in turn urging that they have an appendectomy. With these measures, however, we have been able to perform interval appendectomies in only a little over 50 per cent of our cases. This, perhaps, is one of the greatest limitations of the conservative regime, for we feel that every patient treated conservatively should have his appendix removed to prevent recurrence of symptoms.

Dr. Gamble's contribution in regard to free and open drainage is sound and we make use of his principles in our operative cases. His mortality statistics as well as those of Dr. Crisler are excellent. Anyone whose experience matches theirs should certainly recognize no need to change his methods of management of appendical peritonitis. In our own experience, however, where 90 per cent of our series are public ward patients who are transported an average of 100 miles for treatment, our mortality with immediate operation, though not unlike other hospitals in similar situations, was unsatisfactory and has been significantly reduced by a change to the conservative regime.

I agree with Dr. Crook and Dr. Neal that misunderstanding of the conservative regime either by the profession or by laymen can do a great amount of harm. Certainly, as Dr. Neal advocates and as I have already indicated, the only means of controlling the problem of appendicitis is by a well-directed education of the public in regard to the dangers of abdominal pain and the need for early recognition and removal of the acutely inflamed appendix before perforation occurs. I cannot agree with Dr. Crook, however, in his statement that the cause of the mounting death rate in appendicitis is to be attributed to the Ochsner regime. Undoubtedly, the surgeon's scalpel is often a life-saving instrument. However, I believe it wise for the surgeons of the country to realize that there are times when it may be the better part of wisdom to withhold rather than to administer it.

REVIEW OF THE LITERATURE OF CONGENITAL TUBERCULOSIS*

WITH REPORT OF A CASE

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In cases of congenital tuberculosis, infection takes place in two ways. That most often described, according to Price,[1] is where a placental tubercle is formed, and the infection spreads from the placenta, via the umbilical vein, to the fetal liver, which becomes the site of primary lodgement in the body of the fetus. Intra partum infection by this route is due to the tearing of a tubercle during the separation of the placenta, with release of the bacilli into the umbilical vein. The other route of congenital tuberculosis is by inhalation or ingestion of an infected amniotic fluid, with primary lodgement in the lung or digestive tract.

These findings of the most extensive lesions in the liver and the regional portal lymph nodes have been attributed by Siegel[2] to the peculiarities of the fetal circulation, in which the liver is the first large receptor of maternal blood from the placenta while the pulmonary circulation is slight, the blood being shunted through the ductus arteriosus into the aorta. Cases of congenital tuberculosis have been reported with disseminated involvement in the lungs as well as in the liver, and several instances in which the lesions were limited to the lungs and the regional pulmonary lymph nodes. The findings in these cases in which involvement is restricted to or predominant in the lungs have been attributed to the passage of tubercle bacilli through the ductus venosus Arantii or to the aspiration of tuberculous amniotic fluid or tuberculous matter present in the birth canal.

Congenital tuberculosis may be defined as tuberculosis in which the infection occurs before birth by way of the blood stream (umbilical vein) or at birth by the aspiration of tuberculous amniotic fluid or tuberculous matter present in the birth canal.

It was formerly thought that genuine cases of congenital tuberculosis occurred only when the mother was in an advanced stage of tuberculosis (probably suffering from miliary dissemination and "tuberculous bacillemia"), but more recent observations have shown that placental tuberculosis may likewise occasionally develop when the mother's tuberculosis is not far advanced, or even latent or quiescent.

The first authentic human case of congenital tuberculosis was reported in 1891 by Schmorl and Birch-Hirschfeld.[3] Since that time many other cases have been reported. Péhu and Chalier, in 1908 and 1914,[4,5] from an extensive study of congenital tuberculosis, accepted only 51 cases as definitely proven.

In 1922, Whitman and Greene[6] reviewed the cases of congenital tuberculosis listed in the bibliographies of Warthin and Cowie,[7] Sitzenfrey,[8] Péhu and Chalier,[4,5] Lanz,[9] Weber,[10] and Chomé.[11] They found a total number of 113 authentic cases and 519 more or less doubtful cases of prenatal tuberculosis. To these they added their own case and several other cases they found in the literature. There was no general agreement as to certain of the cases.

Siegel,[2] in 1934, from a review of the literature, reported a study of 38 cases of undoubted or probable congenital tuberculosis, all of them being reported by various authors besides himself.[12-49] The tuberculous organs in these cases were usually lungs, liver and spleen, and after a certain age, intestines. Macroscopically the lesions almost always resembled tubercles. Microscopically the lesions were reported as tubercles except in the lungs, where tuberculous pneumonic areas were not uncommon. Caseation was common; cavitation, ulceration and calcification were also mentioned. In a few cases in which primary lesions were specifically reported, they were described as localized caseous areas in the lungs or liver and in one instance as a diffuse bilateral tuberculous bronchiolitis and alveolitis with beginning caseation.

In this study of 38 cases reported by various authors, Siegel[2] found that the lungs were most frequently involved. The degree of pulmonary involvement was usually equal to and occasionally greater than that of the liver. Less frequently, liver lesions were more marked than the lung lesions. In the cases dying in the latter half of the first month of life, the lungs and regional lymph nodes were usually alone involved. Before and after this period, other organs were usually involved, especially liver and spleen and, in older infants, the intestines. The frequency and degree of hepatic involvement

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varied in three age groups. It was most marked in cases dying in the first two weeks of life, least involved in cases dying in the second half-month of life, and usually involved in cases dying subsequently to this. Tuberculous lesions in the gastro-intestinal tract were seen in 70 per cent of cases thirty-nine days or older, all of which had advanced pulmonary tuberculosis. No undoubted intestinal tuberculosis was reported in infants dying before thirty-nine days of age. The lymph nodes usually involved were the pulmonary, mesenteric and portal in the order of diminishing frequency. A tuberculous source was always reported except occasionally for mesenteric lymph nodes. Acute tuberculous leptomeningitis was reported in only one case.

In 1935, Beitzke[50] reviewed 100 cases of congenital tuberculosis which had been reported in the literature. Of these he passed 61 as true congenital tuberculosis showing lesions in the organs. Since this, there have been other cases reported and reports by Siegel and Singer,[51] Grenet, Metzger, Heraux and Mezard,[52] Kraus,[53] Erlich,[54] Sergent and Durand,[55] Zarfi,[56] Jacobsen,[57] Lucksch,[58] Bertoye,[59] Scheidegger,[60] Price,[1] Trillat, Eparvier, Bertoye and Bertrand[61 62] and Terplan and Hosterman.[63]

Siegel and Singer[51] reported that the frequency with which the tubercle bacilli are carried in the umbilical blood stream from the placenta to the fetus is not well known. If one judges by the incidence of demonstrable tuberculous lesions in the fetus and the new-born infant, the transmission of the bacilli by way of the umbilical vein is extremely rare. Cases of undoubted congenital tuberculosis in a still-born infant[6] and in several new-born infants dying soon after birth with generalized tuberculosis have been cited in the literature. In these cases the lesions were usually most marked in the liver and regional lymph nodes.[13-15 24 26 17 20 2]

Tuberculous areas in the placenta have been reported by some investigators. Sitzenfrey[8] examined twenty-six placentas and found tuberculous lesions in six. Schmorl and Geipel[64] found tuberculous lesions in nine out of twenty placentas. In one case, about two thousand microscopic sections had to be examined before a tuberculous area was seen. Such instances show how minutely the placenta must be examined.

According to Siegel and Singer,[51] patients in whom tuberculosis of the placenta was found usually had advanced pulmonary tuberculosis, with or without clinical evidence of generalized miliary dissemination. However, tuberculosis of the placenta may be found when there is little pulmonary involvement in the mother, such as a small apical lesion.[64] They explain this possibility by the fact that tuberculous bacillemia may occur early in the course of tuberculosis. They studied fifteen new-born infants for evidence of the transmission of tubercle bacilli by way of the umbilical vein. Cultures of umbilical blood by the Lowenstein method[65] were negative for tubercle bacilli in fourteen cases and positive in one. In the case in which the culture of umbilical blood was positive, the placenta had a large tuberculous area. The child was born prematurely at 7 months, and he died three hours after birth with no demonstrable lesions on postmortem examination. A culture of the heart blood was strongly positive for tubercle bacilli. The mother died of tuberculosis eighteen hours after delivery.

Grenet, Metzger, Heraux and Mezard[52] report a case of transplacental infection in a mother, aged 23, who entered the hospital in the ninth month of pregnancy, suffering from severe cachexia. The infant, although small (2,600 grams) seemed normal. On account of the maternal infection, the baby was given bacillus calmette-guerin orally on the second, fifth and seventh day of life. In the second month, diarrhea developed, with irregular fever; vomiting followed; there was rapid loss of weight and disseminated rales were noted in both lungs. The liver and spleen also became involved. The infant died on the sixty-fifth day. Autopsy disclosed generalized tuberculosis with an extraordinary abundance of Koch's bacilli.

Price,[1] in 1937, reported the case of an infant aged 49 days, who died of a tuberculous infection involving the liver, spleen and lungs. The congenital origin was proved by the size of the portal gland, which exceeded by far any other gland. Pulmonary foci were present which could have been mistaken for exogenous lesions; but they were recognized as blood-borne by (a) the transitional stages between miliary disseminations and the large foci in all organs, and (b) the condition of the regional lymph gland. This case showed that not only miliary, but also large solitary caseous foci can be hemic in origin.

In reference to the diagnosis of true congenital tuberculosis, Price,[1] in a discussion of this case, calls attention to the fact that the mother was suffering from a severe pulmonary tuberculosis, and although an infected infant has been

found in cases of light infection, yet a tuberculous bacillemia is more likely to occur with a heavy infection of the lungs. As an early infection of the fetus leads to abortion, one may presume in this case that the infection of the fetus occurred in the later months of pregnancy. Most of the maternal blood supply to the fetus passes through the fetal liver and thus there could have been produced during the intrauterine life the widely disseminated tuberculosis of the liver which was found in this case. The lymphatic drainage of the liver is superiorly to the glands lying on the under surface of the diaphragm, and inferiorly to the hepatic glands lying around the porta hepatica. Both of these groups of glands were affected in this case, but the size of the hepatic gland exceeded by far all the other caseous glands, thus placing the site of primary implantation in the portion of the liver to which the maternal blood first gains access. One knows that the primary entry to the liver must take place in utero.

Lindquist and Lauren[66] reported a case, aged 39 days, which closely resembled that of Price,[1] but theirs showed greater involvement of hilar glands of the lungs. They concluded that the pathological picture of the liver with lung involvement was due to massive outpouring of bacilli into the fetal circulation through a lesion of the placental tuberculous focus during parturition.

Trillat, Eparvier, Bertoye and Bertrand[61] report a case of congenital tuberculosis in a child born to a mother with pulmonary miliary tuberculosis. The baby died when 50 days old. Autopsy disclosed miliary tuberculosis of both lungs. Liver was normal.

Scheidegger,[60] because of the rarity of congenital tuberculosis, was led to report the case of a 12-day-old child who showed dullness over both lungs and high fever and died with marked cyanosis. The autopsy showed disseminated tuberculosis, with tubercles located centrally in the liver, lungs and spleen. Many of these had progressed to caseation. Miliary tubercles were found to be especially thick in the cardiac and skeletal muscles. The mother died of tuberculosis two and a half months after the birth of the child. The caseous nodules in the liver, spleen and lungs of the infant were unquestionably the result of infection from the mother's blood stream.

Terplan and Hosterman[63] report a case of congenital tuberculosis in a six-weeks-old infant. The mother had chronic pulmonary tuberculosis, especially at the base of the left lung. Her spine displayed evidence of Pott's disease at the fourth dorsal vertabra, a disease from which she first suffered eight years previously and for which she had a cast applied to her back for forty-six weeks. Although no large primary focus of infection was found in the liver, the findings pointed to a primary hematogenous congenital tuberculosis. In spite of the fact that the placenta was not examined and that there was no clinical evidence of tuberculous endometritis in the mother, these authors believe that they could hardly explain the anatomic findings in any way other than by placentogenic miliary tuberculosis.

CASE REPORT

Baby F. Y. was delivered January 31, 1937. The grandmother died of pulmonary tuberculosis. The mother had had pulmonary tuberculosis for several years, which became active during the period of gestation.

The mother was brought to Rockingham Memorial Hospital in a serious condition and delivered. She lived two weeks after delivery. The baby was taken from the delivery room immediately after birth and never again came in contact with the mother. His birth weight was 5 pounds 14 ounces and examination showed an apparently normal, healthy child. He took his nourishment well and developed normally, weighing 6 pounds 7½ ounces February 11. On February 12, he developed a rectal temperature of 100°, which continued to vary each day from 99 to 100°, until on February 26 it reached 102.4°. Examination did not reveal the cause of the rise in temperature. On February 27, it reached 103.6°, then both ear drums were inflamed, and the urine showed 15 to 20 pus cells to a high-powered field. He was given sodium citrate, and phenol and glycerine were dropped in the ears. March 4, he showed a definite increase in respiratory rate above what I thought it should be even with fever. Physical examination of the chest revealed nothing definite, but on account of the mother's history an x-ray film was made with the following report by the roentgenologist:

"There is some increase in the hilus shadow and rather diffuse mottling in the middle portion of both lungs, which suggests a possible congestion in the lungs."

He continued to take his formula well, did not vomit and had normal stools. The inflammation of the ear drums subsided, and by March 10 the urine showed only a few pus cells. His temperature, after March 1, ranged from 99° in the morning to 101° at night, a few days reaching 102.4°. His weight March 7 was 8 pounds 8 ounces, a gain of 2 pounds 10 ounces. On March 10, the baby showed slight edema. His blood count was: hemoglobin 55 per cent (Sahli), red blood cells 2,036,000, white blood cells 13,900, polymorphonuclears 45 per cent, lymphocytes 55 per cent, red cells show marked anisocytosis. A transfusion of 50 c. c. of blood was given. Examination on March 12 showed some edema of the face and body, the temperature again rose to 103.4°, chest examination revealed a few fine

rales in both lungs, so a second x-ray plate was ordered. This was made, and the following is the report:

"There is considerable infiltration around the right hilum and peribronchial infiltration extending out along the trunk to the middle and lower portions of the right lung. There is also noted infiltration along the trunks into the left upper lobes and there is mottling in the parenchyma of the left upper lobe. The findings are those of an infection which may be tuberculosis."

March 13, he showed fluid in the abdomen. From that time to March 16, his temperature ranged from 100° to 104.4°. He died at 2:35 a. m. on March 17, 46 days after birth, and consent for a partial autopsy was obtained. The baby took his food well and showed normal stools during all his illness.

Pathologic report of tissue by the Department of Pathology, University of Virginia, follows:

"*Gross Description.*—Half of kidney 6 x 2.5 x 1 cm., half of kidney 6.5 x 3 x 2 cm. were examined. The surface of both was lobulated. No gross pathologic change was seen. Section from the lung was grayish in color and contained air. There were a few small nodules on the surface.

"Section from the spleen was reddish-brown in color. It contained various sized small grayish-white areas.

"Sections from the liver were bile-stained and mottled green and deep reddish-brown in color.

"A small piece of muscular tissue possibly from the heart was examined. No gross changes were seen.

"*Microscopic Examination.*—In the interstitial tissue are a few eosinophils as well as small lymphocytes. An occasional polymorph is seen.

"Section of the heart muscle shows no pathological changes.

"In the liver are innumerable miliary tubercules.

"The lungs are studded with miliary tubercules.

"The same applies to the spleen. Bacterial stain on the spleen shows innumerable tubercle bacilli.

"*Diagnosis.*—Acute miliary tuberculosis lungs, liver and spleen."

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STAPHYLOCOCCUS SEPTICEMIA*

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The rationale of the treatment of staphylococcic infections in the human with antitoxin is established by the experimental data accumulated by our laboratory colleagues. It is remarkable that a vast accumulation of experimental facts pertaining to the protective properties of staphylococcic antitoxin against toxin should produce little clinical interest.

Staphylococcic septicemia is a medical emergency. In this short presentation we will attempt to consider the subject from a clinical approach. It is essential that the basic immunologic principles be always in the foreground in order that we may have a comprehensive knowledge of what we may or may not expect from a therapeutic attempt with a biologic agent.

The strains of staphylococci that invade the human body produce a free or exotoxin that may be obtained by passing these cultures through filters. The filtrate, sterile both aerobically and anaerobically, possesses the property of producing death in experimental animals in amounts as little as 0.5 c. c. of toxin to 1 kilo of body weight. This toxin has the property of necrotizing tissue when injected into the skin. If the dermal dose is large, death will result. Animals inoculated intravenously with a comparatively small dose of toxin live over a period of time. At necropsy these animals show all the microscopic changes of parenchymatous degeneration in the viscera, indicative of a profound toxemia. Blood destruction occurs, producing marked anemia. The activity and formation of granular elements of the blood may be inhibited. The toxin also possesses the ability to enhance the coagulability of the blood. Hence, the frequency of thrombosis and embolic processes during the clinical course of a staphylococcus septicemia. Antitoxin protects the experimental animal against several lethal doses of toxin. Rabbits inoculated with virulent cultures of living staphylococci live longer when treated with antitoxin and the mortality is reduced.

To evaluate the therapeutic efficiency of a biologic agent in the treatment of staphylococcic invasion of the human organism, it becomes necessary to establish a definite and accurate accumulation of statistics that may be considered as basic. The difficulty of this effort becomes apparent when one attempts to evaluate hospital records. The statistics from the literature all show a mortality of over 60 per cent, and most observers place the mortality in excess of 75 per cent. It is our opinion that what constitutes staphylococcic septicemia markedly alters the statistics relative to the mortality.

In an attempt to establish the mortality in staphylococcic septicemia, we reviewed the histories of 65 cases from the records of Kansas City hospitals. In this Group 3 positive blood cultures, on subsequent or alternate days, was established as the criterion for diagnosis. No cases of osteomyelitis were included. To our surprise there were 64 deaths and 1 recovery. The resulting mortality was so appalling that it was decided to review case histories from other institutions. One hundred from two Eastern hospitals and, through the courtesy of Dr. Harrison Rigdon, 35 case histories from the files of the medical department of Vanderbilt University were received. The criteria of what constituted septicemia in these 135 cases consisted of a clinical diagnosis plus a positive blood culture. The number of positive blood cultures varied from 1 to 26. We are indebted to Dr.

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L. P. Randles, Resident Physician of St. Mary's Hospital, Kansas City, Missouri, for reviewing these records for statistics.

Burky[1] has called attention to the fact that very young rabbits show a greater tolerance to staphylococcus toxin than does the adult animal. Our study of 200 records shows that recovery in suckling infants occurs with greater frequency than in adult life. This may account for the fact that osteomyelitis is not common before the second or third year of life, and would suggest that the same immunity as is possessed by the suckling infant against diphtheria, measles, scarlet fever and mumps probably applies to staphylococcus septicemia.

Osteomyelitis, in our opinion, is a clinical entity separate from true septicemia. This contention is supported by the fact that acute osteomyelitis is accompanied by a mortality of approximately 25 per cent; a benign infection as compared to staphylococcus septicemia in the adult.

To support this contention, Weaver,[2] of the Department of Orthopedic Surgery of the University of Kansas, has studied the antitoxic content of the blood in well over 200 cases of osteomyelitis. In an article, yet to be published, he states that in acute osteomyelitis with a favorable prognosis, staphylococcus antitoxin appears in the blood in almost unbelievable amounts. In fatal cases no natural antitoxin is present. He says that these findings are present in over 90 per cent of his cases.

In an attempt to establish the prognosis and mortality of the invasion of the human body with staphylococcus, in our judgment, these findings should be placed in three great groups.

First Group.—The suckling infant, from our records, shows a much greater tendency towards spontaneous recovery than does the adult.

Second Group.—The invasion of the body with staphylococcus and the subsequent production of osteomyelitis are accompanied by a mortality of approximately 25 per cent in the acute cases. In the large majority of these cases, death occurs in the early course of the infection. It would be approximately correct to state that 50 per cent of these cases show a positive blood culture.

Third Group. — Staphylococcic septicemia without invasion of the bone.

In staphylococcus osteomyelitis the rapid ascent of antitoxin in non-fatal cases would indicate that antitoxin is one of the immune defenses of the body that markedly influences the prognosis. Conversely, in septicemia that occurs without involvement of the bone, we have found natural antitoxin present in only one instance. This can be interpreted, from an immunological standpoint, to mean that the human organism is overwhelmed with the toxin or antigen and fails in its response to elaborate self-developed antitoxin. These are facts that, in our judgment, support the findings of the laboratory investigators, that the attempt at therapy with staphylococcus antitoxin is rational.

A discussion concerning the problem of the immunity of a suckling infant from a non-immune mother has no place in a presentation of this nature. Yet its existence is universally recognized.

Of the 200 case histories of staphylococcic septicemia reviewed, 8 were rejected because of insufficient data. Two cases had been treated by the administration of staphylococcus antitoxin with 1 recovery and 1 death. These cases were also rejected. In 13 cases of osteomyelitis reported, the mortality was 38 per cent. Of the 28 cases of infants under 18 months of age who suffered from staphylococcus septicemia, the mortality was 78 per cent. In 102 cases over 18 months the mortality was 94.1 per cent. In 47 cases of unknown age, 5 recovered and 42 died, a mortality of 93.6 per cent. Of the 177 cases of staphylococcus septicemia of all ages, 91.4 per cent died.

200	8	2	13	28		102	47
				LIVED	DIED	LIVED	DIED
TOTALS				6	22	6	96
PERCENTAGE				22%	78%	5.9%	94.1%

	LIVED	DIED
STAPHYLOCOCCUS SEPTICEMIA OF ALL AGES - 177 CASES	17	160
PERCENTAGE RESULT	9.6%	91.4%
STAPHYLOCOCCUS SEPTICEMIA TREATED WITH ANTITOXIN - 17 CASES	8	9
PERCENTAGE RESULT OF TREATED CASES	47%	53%

Fig. 1
Statistical resume.

We have treated with antitoxin a considerable number of cases of staphylococcus infection of all types in the human.* It is our purpose to report here only true septicemia in adults without involvement of bone. This group constitutes 17 cases, of whom 9 died and 8 recovered.

A patient with septicemia, with 2 positive blood cul-

*The authors are indebted to Lederle Laboratories for furnishing antitoxin to indigents in this series.

tures, now confined in St. Mary's Hospital, has received 200,000 units of antitoxin in conjunction with an experimental serum of promising value. This case is rejected from our series because the treatment was not confined exclusively to antitoxin.

Another case, a man 59 years old, taken from the records of the Kansas City General Hospital, suffered concurrently from a furuncle on the neck subsequent to an automobile accident, had a positive blood culture for a hemolytic Staphylococcus albus, and developed 17 cutaneous abscesses that were incised and drained. Aspirated pus from the metastatic lesions showed staphylococcus and streptococcus. He apparently recovered after the administration of staphylococcus antitoxin and sulfanilamide and for four days was free from all evidence of infection with a normal temperature, then suddenly died. Death occurred approximately 12 weeks after his automobile accident. At necropsy, fracture of the base of the skull along with fracture of the atlas and axis, was found. The mechanism of death was edema of the lungs with cardiac failure. No evidence of sepsis was found at autopsy aside from the old wounds where drainage had been instituted. This case is rejected from the series.

Of the 9 fatal cases of septicemia that received staphylococcus antitoxin during treatment, necropsy was obtained in 6 cases; and in all 6 cases the diagnosis was substantiated by characteristic postmortem findings. In 2 of the cases autopsy findings were enlightening to the clinicians.

One case was an extremely obese woman who had been ill a month and had positive blood cultures for *Staphylococcus aureus*. The blood cultures became negative after antitoxin. A wild delirium continued during the last week of her life. During the second week of her illness an abscess pointed below Poupart's ligament, approximately in the location of Scarpa's triangle. This was incised, a forceps passed upward and approximately 500 c. c. of pus was evacuated. At necropsy the pathologist investigated this area and found that approximately 1,000 c. c. of pus, beginning at the lower pole of the kidney, was completely divided from the similarly drained abscess by a fascial plane that had opened into the hip joint. The viscera, upon microscopic examination, showed little evidence of toxemia. It is our opinion this was a death caused by the absorption of the necrotic products and the non-specific toxin of the necrotic tissue in a surgically accessible area.

The second case gave all the clinical evidences of septicemia with a known port of entry. Blood cultures were taken on the day of hospital admission, and the following morning the hospital laboratory reported the presence of a staphylococcus and a contaminating bacillus. Therefore, we were inclined to look with suspicion upon this culture. Additional cultures were taken upon two subsequent days, two were reported positive the third morning and that same evening the third culture was positive. At the time of the original examination the chest showed nothing abnormal, but three days subsequently there were physical findings in the chest. Portable x-ray showed metastatic involvement of all five lobes of the lungs. Death occurred.

Another case that came to autopsy at St. Luke's Hospital was in a rugged boy 17 years old, who suffered from a furuncle on his arm followed by chills and fever with a positive blood culture and was so overwhelmed by his toxemia that death occurred on the third day. At necropsy only three small abscesses were grossly apparent in the lung. The duration of life, subsequent to his septicemia, was three days. The viscera were very dark, as is observed in blood concentration. This patient received 100,000 units of staphylococcus antitoxin 24 hours before death. No therapeutic response was obtained. This would suggest the fixation of the toxin to tissue cells. The viscera showed little evidence of a toxemia upon histological study.

Two of these reported cases illustrate the importance of surgical drainage. It is our belief that when an individual suffers from a furuncle or a staphylococcic infection upon the skin accompanied by chills, fever and profound prostration in the absence of all physical findings, the probability of staphylococcus septicemia exists. We would seriously question the advisability of the loss of several days' time in the hope of obtaining a positive blood culture before treatment is instituted. In certain staphylococcic septicemias it may be possible, when the port of entry occurs on the skin, to recover the invading organism from the local cutaneous lesion, blood stream, urine and the sputum.

Of the cases that recovered all were acutely ill and ran stormy courses.

TREATMENT

Each individual case of staphylococcic septicemia presents clinical manifestations over a widely divergent field. This fact makes comparison of different groups of cases, as to the mortality and response to therapy, difficult to evaluate. A septicemia may precipitate a shower of bacterial emboli into the cortex of the brain or a large septic embolus may lodge in a vital center inaccessible to surgical drainage and the case becomes at once hopeless. If septic emboli occur in the extremities and surgical drainage evacuates the pus, the prognosis as to life becomes better.

In the clinical specific treatment of staphylococcic septicemia in the human, the clinician tests the patient's sensitivity with the antitoxin to be used, and in the absence of any evidence of wheal formation at the expiration of a 30-minute period, 1 c. c. of antitoxin is injected deep into the buttock. If, in the ensuing hour, there is no reaction and the patient shows no constitutional evidence of anaphylactic phenomena, 20,000 units of antitoxin may be injected deep into the great muscle at hourly intervals. We have used antitoxin intravenously and intraspinally. The reactions occasionally have been disturbing; and while absorption is slower, we

feel that for the present the larger muscles are to be used for the site of the injections.

The dose of antitoxin necessary to combat staphylococcic septicemia is, as yet, difficult to determine. By definition it is that amount of antitoxin necessary to neutralize free toxin to excess. We know of no method whereby circulating toxins in the blood stream can be measured. By the method of Parish,[3] free antitoxin can be demonstrated in the blood. We have found several cases of staphylococcic septicemia in which 125,000 units of antitoxin were administered before free antitoxin could be demonstrated in the blood. It is known that antitoxin will bind itself only to toxin. The cases requiring antitoxin in amounts in excess of 100,000 units would indicate a profound toxemia.

We have observed on several occasions reactions in which an apparent septicemia has become quiet and subsequently become active. This, in our judgment, is an indication for the further administration of serum. Unfortunately the estimation of the amount of antitoxin present in the blood requires laboratory facilities that are not generally available. An excess amount of antitoxin in the blood would be of far more therapeutic value than a quantity barely sufficient to neutralize the toxemia.

Supportive Measures.—Transfusions of blood and an attempt to keep the blood chemistry within the limits of normal are routine procedures. If x-ray is available roentgenograms are of prognostic significance. We have seen recovery with rather extensive involvement in the chest. The essential pathology in the chest consists of minute millet-seed abscesses, gross abscesses, or frequently a combination of both, and the presence of a so-called septic pneumonia, which is generally a forerunner of death. The clinician is frequently surprised at the comparative lack of physical findings in the chest during the illness. Necropsy will often show pathological involvement far in excess of the physical findings.

SUMMARY

Experimental evidence is ample to establish the fact that in laboratory animals death can be produced by sterile staphylococcus filtrate or toxin. It is possible that in a specific case of staphylococcus septicemia three potent factors are present: the invasive factor of the organism in question, the toxemia produced by the metabolism of the invading staphylococcus, and the necrotic non-specific toxins produced by the disintegrating tissue associated with the formation of pus.

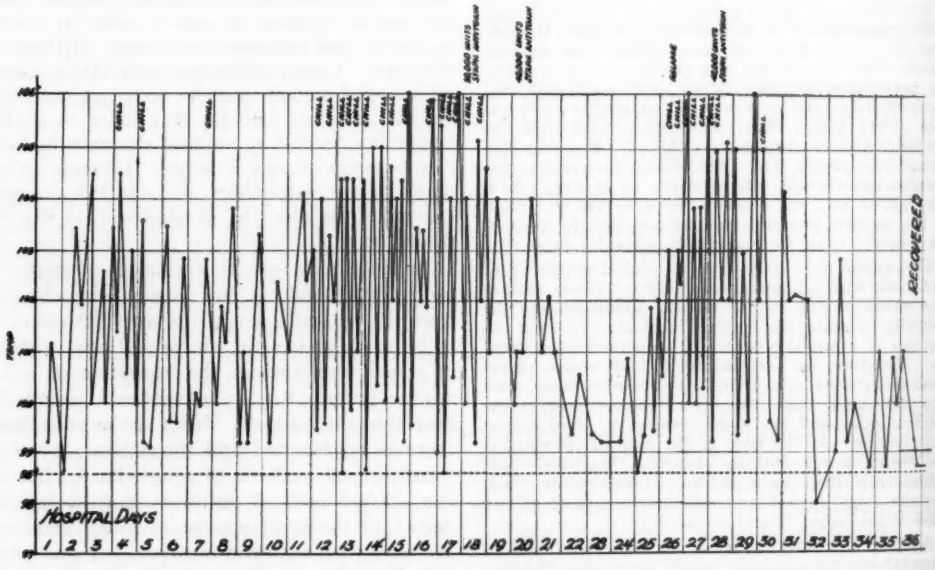

Fig. 2

E. R., aged 48, female, staphylococcus antitoxin 100,000 units. Note the recurrence of chills after 60,000 units of staphylococcus antitoxin.

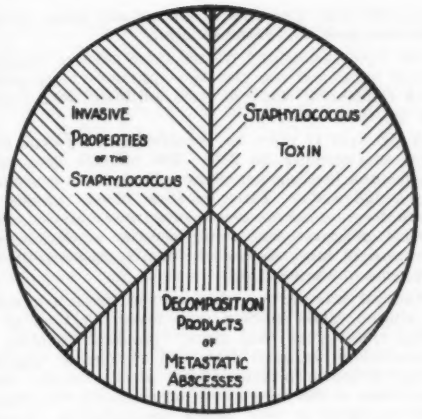

Fig. 3
Schematic consideration of the factors involved in staphylococcus septicemia.

There is considerable experimental evidence to show that invasive properties of the staphylococcus are inhibited when the patient shows a high titer of natural antitoxin or passive immunization by the administration of staphylococcus antitoxin. This latter point is well illustrated by the behavior of cases of osteomyelitis that possess natural antitoxin in the blood. The toxin fraction can, beyond question, be neutralized by the administration of antitoxin. It is very probable that the toxin binds itself to body tissue cells in a comparatively short period of time, and that antitoxin is, to a degree, therapeutically efficient in direct ratio to the time that has elapsed between the invasion of the blood stream and the establishment of a diagnosis. This can be interpreted as the plea for frequent blood cultures in the presence of chills and fever of unknown etiology. That fraction of the process of human invasion that has to do with the necrotic tissue and the formation of pus is, of course, a surgical problem. The abscesses may be single or more frequently multiple, and surgical drainage may or may not be possible. It is obvious that when an acute endocarditis occurs, or when the lungs show involvement of the five lobes with metastatic abscesses, the prognosis with or without serum is almost hopeless. There is another group of cases in which our experience constitutes between 12 and 13 per cent of all cases, in which death comes between the third and fourth day as a result of an overwhelming septicemia and toxemia. These cases, we believe, will not respond to therapeutic serum. The attempt to treat staphylococcic septicemia will be, in at least 50 per cent of the cases, a bitter disappointment to the clinician. However, in the group of cases that recover as a result of the therapeutic use of antitoxin with their rapid drop of pulse and temperature subsequent to the administration of staphylococcus antitoxin, is but positive evidence that this seemingly hopeless septicemia can, to a degree, be mastered by the judicious and early use of antitoxin. This percentage of recovery is yet to be determined. In our judgment, it is in direct ratio to the ability of toxin to cause death and we believe that the toxin fraction can be completely neutralized at the onset of the septicemia.

CONCLUSIONS

In a compilation of 117 cases of staphylococcic septicemia from various hospitals the gross mortality is found to be 91.4 per cent.

In 28 children less than 18 months of age the mortality is found to be 78 per cent, and in patients over 18 months the mortality is found to be 94.1 per cent.

Of 17 cases of staphylococcic septicemia treated with staphylococcus antitoxin the mortality was 53 per cent.

Plea is made for the early diagnosis and treatment of staphylococcus septicemia with adequate amounts of antitoxin to prevent irreparable tissue damage.

Although the mortality is markedly lowered by the early administration of staphylococcus antitoxin, the ideal biological has not been attained.

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DISCUSSION (*Abstract*)

Dr. R. H. Rigdon, Memphis, Tenn.—As far as I have been able to determine, this is the largest number of cases of staphylococcus septicemia in a single series treated with staphylococcus antitoxin that has been reported in this country. It is difficult to establish the mortality rate in staphylococcus infections. It is interesting that the mortality rate in cases of staphylococcus septicemia not treated with staphylococcus antitoxin was found to be 91.4 per cent, while the mortality rate was only 53 per cent in a series of 17 cases treated with staphylococcus antitoxin. Although the number of cases treated with antitoxin is small, I consider the results very significant. The rigid requirements considered by Drs. Stookey and Scarpellino for a case of

staphylococcus septicemia are significant in establishing the mortality rate in this disease.

The authors say that experimental animals die from the effects of staphylococcus toxin. I think there is evidence that humans also die from the effects of this toxin. I recall a case of a child with acute otitis media and bilateral mastoiditis due to a hemolytic *Staphylococcus aureus* that died about two weeks after operation. At autopsy there were lesions in the gastro-intestinal tract similar to those produced in the rabbit with staphylococcus toxin.

It is interesting to know that some patients require much larger doses of antitoxin before free antitoxin can be demonstrated in the circulating blood. This may mean that the antitoxin localizes in the areas of infection in one case more than in another. There is experimental evidence to show that staphylococcus antitoxin does localize in areas of inflammation as a result of a local increase in capillary permeability.

It has been pointed out that staphylococcus antitoxin lowers the mortality rate in experimental animals given cultures of staphylococci intravenously. I think the data presented in this paper show that antitoxin has a similar effect in the human. In view of the results obtained in experimental animals, it may be correct to consider a similar mechanism of immunity in man as in these animals.

Inhibition of necrosis may be demonstrated in the abdominal muscle of a mouse given staphylococcus antitoxin intraperitoneally and a toxin producing strain of staphylococci subcutaneously. The second lantern slide shows a few polymorphonuclear leukocytes in the area of the bacteria in a normal mouse and a large number of leukocytes surrounding the organism in the immune mouse. These sections show that the toxin apparently is neutralized by the antitoxin and prevents the necrosis of the muscle and also the leukocidin is neutralized by the antitoxin and the leukocytes therefore are not destroyed. The leukocytes in the immune mice have a much better opportunity to phagocytose the bacteria.

In closing I would like to say that if experimental data are of value in determining whether or not a biological product has any therapeutic value I believe this has been shown with staphylococcus antitoxin. Furthermore, the data in this paper of Drs. Stookey and Scarpellino indicate that it is also of value in the treatment of human cases of staphylococcus septicemia. As has been emphasized, it is not a cure-all, but must be used with the same precautions as other sera. It must be given early and with some knowledge of what the staphylococcus and its toxins can do in the human body.

Dr. Gilbert J. Levy, Memphis, Tenn.—This splendid contribution has given us specific examples of the therapeutic evaluation of staphylococcus antitoxin in the treatment of staphylococcus septicemia. Any therapeutic agent which tends to neutralize the toxin of staphylococcic sepsis and curtail the excessively high mortality is worthy of trial. A recent analysis of twenty-four cases of staphylococcus septicemia from the records of the John Gaston Hospital for the years 1933 to 1937 presented a fatality of nearly 80 per cent. In none of these patients was staphylococcus antitoxin used. In those cases which recovered the treatment consisted of surgical drainage, frequent blood transfusions and large quantities of glucose and saline solution subcutaneously and intravenously.

We have successfully treated three cases of staphylococcus sepsis and one case of staphylococcus meningitis with commercial staphylococcus antitoxin since December 23, 1936.

A girl aged 12 years was admitted to St. Joseph Hospital on December 23, 1936. The original focus was a small furuncle of the left elbow. From this a generalized sepsis followed. Three positive blood cultures for *Staphylococcus aureus hemolyticus* were obtained. The clinical diagnosis was staphylococcus septicemia, empyema right lung, abscess left lung, acute nephritis, and empyema of the left thigh.

Surgical drainage was obtained and frequent infusions of glucose saline solution were given. A total of six blood transfusions were given, "prontosil" solution intramuscularly in small doses and commercial staphylococcus antitoxin totaling 60,000 units. Twenty thousand units of this were given intravenously well diluted, and produced a very severe anaphylactoid reaction. Apparently this severe shock assisted rather than hindered the course of the case. The patient improved steadily and was discharged as cured February 19, 1937.

A girl 12 years of age was admitted to St. Joseph Hospital on December 12, 1936, and discharged on February 19, 1937. The history indicated chronic osteomyelitis of the left femur. The temperature range was a typical septic curve. Blood culture was positive for *Staphylococcus aureus hemolyticus.*

Treatment consisted of surgical drainage, 45,000 units of commercial staphylococcus antitoxin intramuscularly, and 5,000 units intravenously. Rapid uneventful recovery followed.

A white girl 18 years old was admitted to the Isolation Hospital on July 7, 1938, and discharged cured on August 21, 1938. The clinical diagnosis on admission was gangrenous diphtheritic infection of the tonsils and pharynx, for which generous amounts of antitoxin were given intravenously and intramuscularly. Throat cultures proved this to be *Staphylococcus aureus.* The initial blood culture was positive for *Staphylococcus aureus hemolyticus.* A very stormy course followed. Treatment consisted of eight blood transfusions, 3,645 grains of sulfanilamide and 100,000 units of commercial staphylococcus antitoxin given intravenously and intramuscularly. The severe methemoglobinemia was controlled with 1 per cent solution of methylene blue given according to the method of Wendel. The staphylococcus antitoxin apparently hastened the progressive recovery of the patient following its first injection.

A negro woman, aged 28 years, postpartum 8 days, was admitted to the obstetrical service of the John Gaston Hospital on November 1, 1938. A tentative diagnosis of eclampsia was made. Careful examination revealed a rigid neck with positive Kernig and Budzinski signs. The spinal fluid was positive for *Staphylococcus aureus.* The first blood culture was negative. The case was transferred to the Isolation Hospital on November 8. Commercial staphylococcus antitoxin was given intravenously and intramuscularly daily. At the same time oral sulfanilamide was given in liberal dosage.

The total amount of antitoxin given was 70,000 units intravenously and 100,000 units intramuscularly. The total amount of oral sulfanilamide was 420 grains. A blood transfusion was given November 12. The patient has shown remarkable improvement. The spinal fluid

cell count on November 11 was 12 cells. The spinal fluid culture was negative. The patient is now able to sit up in bed.

We feel that the use of staphylococcus antitoxin is justified in staphylococcus sepsis. It must be given as early as possible for its antitoxic effect.

Dr. A. A. Herold, Shreveport, La.—I wish briefly to report a case which convinced me that staphylococcus septicemia is not a condition to be treated lightly. A brother physician accidentally pricked his wrist with a hypodermic needle just as he was leaving home for a medical meeting. When he came through Chicago he had fever and pain in the wrist and consulted a surgeon, who advised him to remain there in the hospital for a few days for observation and treatment. He did not "have time" to do this and rushed home, where he developed a series of chills and had to go to the hospital, where a blood culture revealed staphylococcus, and his complications were arthritis in one ankle, one knee, one elbow, and one wrist, from which he made a tedious recovery, and still has a residuum of a stiff knee, which will be permanent. To make a long story short, he could not spend a few days in the hospital in Chicago, but spent seven months in one in Shreveport.

FURTHER OBSERVATIONS ON THE SCHILLER PRESUMPTIVE TEST FOR CARCINOMA OF THE CERVIX*

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Early recognition of cancer at any site is highly desirable, but in many instances most difficult. Such recognition is necessary, however, if we are to accomplish worth-while results in the matter of treatment. Since the development of surgery and irradiation therapy in the treatment of cancer, there has been nothing new brought forth materially to increase our efficiency in the treatment of malignancy. Extensive investigations have been, and are at present, being carried out in laboratories and hospitals, but the general practitioner has not been helped or stimulated materially to investigate and evaluate his cases more thoroughly.

As it is a well-established fact that early recognition and prompt treatment yield best results, it is logical that any method which tends to assist the practitioner in the early recognition of carcinoma deserves further consideration and elaboration. While progress in operative technic has been accomplished this has been largely in refinement of methods, and no new principles have been evolved. Radiotherapy has been developed in the fuller utilization of the x-ray and radium, but without the development of any new principles in this field. Improvement in the results of treatment therefore will depend upon the early recognition of the malignancy and the immediate application of the mode of therapy best suited for the particular case. In a recent address, Adair of the Memorial Hospital, New York, advocated self-examination of their breasts by women over forty and the prompt reporting to their physicians of any suspicious lumps or abnormal conditions. Community campaigns by lay, medical and combined groups are now waging educational propaganda against cancer in many localities with emphasis on advising the patient to visit her physician early, yet we still find a large percentage of malignancies discovered in well-advanced stages of development.

As approximately 90 per cent of the carcinomata of the uterus arise in the cervix, and as the uterine carcinomata take second and third place in most carcinomatous statistics, the earliest possible recognition of this malignant condition is absolutely essential. Most cases of this type that come to the attention of the pathologist are well-advanced, and in many instances already in the state of metastasis and beyond the possibility of a complete cure. By systematic routine examination, the beginning of very early carcinoma of the cervix may be demonstrated if one knows the characteristics of this development. In a previous communication we quoted from Graves[1] a statement which we believe cannot be repeated too often:

> "The logical conclusion is that every cancer of the cervix passes through a period, in its early life history, during which it is theoretically one hundred per cent curable. This is the rock on which the hope of controlling the disease is at the present time based. Ultimate success depends on the coordinated efforts of every member of the profession, who treats women at all, to detect and bring to treatment the early cases."

One of the primary requisites in the search for early cases is the knowledge of the average life history of a cervical cancer, amounting to from ten to twelve years or more, and including a long irritative stage of chronic cervicitis and a shorter, though still protracted period of clinical latency, during which the cancerous change eludes the attention of the patient and her attending physician. Prompt repair of the damaged and inflamed cervix with routine biopsy and histopathological examination formerly constituted the principal means for the discovery of the latent stage of many unsuspected can-

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cers. This procedure, however, is not widely enough used to pick up the majority of latent carcinomata of the cervix and is carried out with reluctance by many practitioners and surgeons in the absence of definite clinical manifestations, particularly during the child bearing period. This, together with the inability of the surgeon to select the tissue from the proper area and the unfamiliarity of many pathologists with the incipient changes, have to a considerable extent invalidated these means.

Major credit for the solution of the two cardinal problems of early diagnosis, namely, a clearer idea of the histologic appearance of early cancer and a simple test whereby the latent area may be accurately localized for biopsy, is due to Walter Schiller.[2] He first studied closely cervices of 135 uteri removed by total hysterectomy for causes other than cancer, the latter itself being unsuspected. Among these he found four (2.96 per cent) with microscopic evidences of apparently the earliest stages of cancer. His observations and conclusions may thus be summarized:

> Under the stimulus of chronic irritation, the cancerous process starts (no one knows how) in the single cell of the basal layer of the epidermis of the portio vaginalis, and this malignant cell produces a virus capable of inciting malignancy in adjacent normal cells. This activity called "assimilation" marks the first stage of malignancy in cervical cancer in which the growth extends laterally as a drop of ink spreads on blotting paper. Since there is at first no thickening or change of the consistency in the epidermis, the affected area is indistinguishable visually or tactually from the surrounding normal tissue.
>
> Such cancerous process never heals spontaneously, but progresses to the so-called late stage of invasion, extending now by the multiplication of its own cells, and invading and destroying adjacent tissues. This late cancer is characterized by nodular thickening, ulceration, metastasis, infection, necrosis and bloody fetid discharge.
>
> Histologically, a cancer in the "assimilation stage" exhibits an abrupt demarcation between itself and the normal epidermis in the form of an oblique line, with normal epidermoid cells in the usual tri-layer arrangement on one side, and on the other the cancer cells, with blurred or broken basal line, above which is a confusion of cells of irregular size, form and staining properties with slight, if any, evidence of differentiation and layer formation. All other signs of cancer are seen except that invasion of the stroma which, if present, is indicative of the second or advanced stage of development.
>
> In order to render it possible to reveal the location of an early process visually or tactually indistinguishable, Schiller devised a test based on Lahm's[8] discovery that the upper layers of the portio vaginalis are rich in glycogen which disappears when the epithelium becomes cornified or altered by cancer. In normal living tissue glycogen of upper cell layers is stained in a few seconds a deep mahogany brown by iodine solutions, while superficial areas of early cancer, devoid of glycogen, fail to stain and appear strikingly white or pink against the intensely dark background of normal tissue. In 533 clinical tests, Schiller obtained a positive result in 140 cases, 19 of them showing early cancer by histologic examination.

Others reporting on the routine examination of the cervix include Graves,[1] who discovered three cases in which there was neither tactile nor visual evidence of cancer, and in making the biopsy there was no other guide to the location of the cancer. Frank,[4] describing his method for early recognition of suspected lesions by the use of Lugol's solution, states that a positive result does not indicate absolutely the existence of carcinomatous areas, since in prolapse, descent or hyperkeratosis originating from lues, they are not stained, and in consequence of injury from forceps or rough introduction of speculum the uppermost epithelium may be scraped off containing the glyogenic dark staining epithelium. Kranzfeld,[5] in the examination of 1,300 women, involving leukoplakias and iodine negative areas, found 2.2 per cent positive for malignancy. He stressed the advantages and uses of the colposcope, but concludes it belongs only in the hands of the experienced examiner.

Hamant and Chalnot[6] emphasize that every woman examined by the physician should be subject to a thorough search for incipient carcinoma. They discuss Hinselmann's work in connection with colposcopy and the Lahm-Schiller test, concluding that the test possesses the merit of indicating suspicious areas, but must be supplemented by biopsy. Concerning hysterectomy, they believe that it is of great value as a means of making biopsies at the proper site, but is otherwise of little worth. Galloway,[7] in a discussion of the merits of the Schiller test, states that it has the advantage of being simple, painless, requires no expensive apparatus and is made quickly. It is his opinion that experience is necessary, and one requires the assistance of a well-trained pathologist who is capable of making a diagnosis from small pieces of tissue. He recommends the Gram's solution rather than Lugol's, as the latter is much too strong and the results therefrom are unsatisfactory. He concludes with the statement that the test is primarily for office routine and periodic examinations, particularly for patients who have no clinical manifestations or symptoms of cancer.

Our experience with this test has been not unlike that of other observers, namely; that we

have found the test to have the advantage of being easily and readily used by the general practitioner as well as the obstetrician, gynecologic surgeon or pathologist; it requires no expensive set-up; it is non-painful to the patient; it can be easily made a matter of office routine or periodic examination; and while it is somewhat specific in the absence of carcinoma in normal cervices, it clearly points the way for a presumptive diagnosis in positive cases and gives a definite indication as to the areas involved from which confirmatory histopathological examination may be made.

While the test is quite simple, it also has certain limitations which may be enumerated briefly. It fails to stain glandular epithelium and epithelium of adenocarcinoma, also ulcerations and erosions devoid of epithelial covering. There is also noted partial failure in chronic cervicitis where the epithelium deficient in glycogen, stains a very light brown, blending with surrounding deeply stained tissue and not sharply defined therefrom as in the geographic outline of true cancer. In trauma it is also somewhat inefficient, due to the fact that the upper layer of cells have been rubbed off with loss of the dark staining glycogen content. It is not reliable when applied to the cervix and vagina of hypoplastic and atrophic conditions, which, while staining more or less uniformly, are lighter than normal. Pus, the leukoycytes of which are rich in glycogen, and necrotic tissue, give an intensely black discoloration which is confusing; while hyperkeratosis, such as is seen in leukoplakia, lues and exposed areas in prolapse, together with mucus, blood and douche water, do not take or prevent staining. It has little value in advanced cancer, where the superficial assimilation stage is obscured by masses of self-reproducing cells which have lost their glycogen. Lastly, the test is specific for cervical cancer alone and not adaptable to other superficial cancers of the vulva or skin, owing to the fact that normal epidermis of the portio vaginalis is not cornified and the upper layers contain a special chemical type of glycogen.

The Schiller test as we have used it with slight modifications from our previous report[8] is as follows:

With the patient in the minor position, any speculum, as a Simms bivalve, may be used. The mucous discharge is carefully wiped off of the cervix and out of the vaginal vault. With a small glass syringe pour in from 20 to 30 c. c. of the test fluid and allow to stand one minute (it stains in from thirty to fifty seconds), then mop out the excess solution with a gauze sponge.

A uniform dark staining area is normal tissue; but one of the earliest signs of a beginning carcinoma is the diminished glycogen content of the epithelial layers which exhibit no affinity for an iodine stain; so the effected areas are unstained.

The stain fades in three to five minutes and may be repeated if necessary. There is a very definite line of demarcation between normal and pathologic tissue, and scrapings or a biopsy may be taken from the non-staining areas for further microscopic study. A vast amount of biochemical work has been done to prove the constant finding of a diminished glycogen content as a forerunner of approaching malignancy. This is not a test for carcinoma above the cervix, but only for the cervical portion.

With this test, white or non-staining areas are found as follows:

(1) Traumatic, due to mechanical injury, as scraping: sharp, clear-cut line of demarcation.

(2) Hyperkeratosis or hornification (a low glycogen content) caused by: (a) prolapsus; (b) syphilis (syphilitic leukoplakia quite rare); (c) senile involution.

(3) Beginning carcinoma, sharply defined "geographical aspect," appearance of being slightly elevated.

Confusing conditions are: (1) cervical erosions, in which the mucous membrane does not stain and the test is not effective, as the beginning carcinoma is epithelial in origin.

(2) A general poor stain, particularly in debilitated patients who have a constitutionally low index with altered nutritional changes in all tissues. These individuals should be placed on a good nutritional and therapeutic regime directed toward improving their general health and the test repeated in a few weeks.

Test Solution:

Iodine crystals	1 gm.
Potassium iodide	2 gm.
Distilled water	300 c. c.

This solution should be frequently freshly prepared to insure best results.

In a series of 152 selected cases in women

varying in age from 32 to 87 in which this test was used as a presumptive diagnostic procedure, the following results were obtained:

152 CASES SELECTED BY PRELIMINARY TEST

41, or 26.97 per cent, showed geographic outline

22, or 14.54 per cent, proved to be carcinoma histologically.

2, or 1.31 per cent, were missed or not present at the time of examination.

DISCUSSION

The Schiller test based on Lahm's demonstration of the glycogenic content of the cells of the cervix uteri is applicable and of considerable value in the recognition of carcinoma of the cervix in its earliest so-called latent period.

It is a procedure easily performed by the general practitioner as well as the gynecological surgeon or pathologist, and is particularly applicable for office examinations and periodic examinations.

It is more or less specific in the absence of cancer and should be tried in all suspicious cases and routine gynecologic examinations.

The test is specific for the portio vaginalis only and has certain other limitations with which one must be familiar in the proper evaluation of the reaction.

Our experience seems to indicate that it is an excellent presumptive test when positive, indicating from where the biopsy section or tissue scraping may be made for the more conclusive histologic examination.

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DISCUSSION (*Abstract*)

Dr. Wayne M. Hull, Oklahoma City, Okla.—The Schiller test probably has greater practical value than is generally believed and its significance in the early diagnosis of carcinoma of the cervix deserves special consideration. The test is used by a number of practitioners in this section of the country, but there are quite a few, however, who do not use the test and there are also a few who have attempted its use, but for various reasons have not properly understood its technic and interpretations and have discontinued it. Like various laboratory aids, its limitations are often overlooked. The test is used frequently in our own gynecological department at the University Hospital, but there seems to be a tendency in the larger institutions to replace the test by routine biopsies of suspicious areas, so that probably many early lesions are overlooked. The test, of course, is not specific for carcinoma, but for areas which show no glycogen such as is produced by early carcinoma and various other lesions mentioned in Dr. Hunter's paper. I feel that several points should be emphasized, one being that the test will show lesions which cannot be seen or felt, and any test which will give this information deserves attention. The test is clinically reliable when negative and therefore specific in determining the absence of carcinoma. Further use of the test can be made in surgical removal of carcinoma of the cervix by staining the marginal zones of the new growth to insure that the malignancy is completely removed.

This test was not intended to replace biopsies, but to indicate the cases which should be biopsied and in addition definitely to identify the specific areas which are to be removed for histopathological study.

Dr. Hunter (closing).—This test is more of a presumptive one than an absolute diagnostic procedure. Its greatest value lies in the fact that it can be used as a routine measure by the clinician and it serves as an excellent aid in the prompt recognition of carcinoma of the cervix by the more exact histologic methods in all suspicious cases. When negative in routine examinations it relieves the clinician of further investigation and possible useless biopsies, and when positive points the way to the exact site from which a satisfactory piece of tissue may be obtained for histopathologic examination by a qualified pathologist.

It should also be emphasized that it is of limited value in the detection of late carcinoma of the cervix and is not applicable as a test for carcinoma of the vulva, skin and other parts of the body.

CANCER OF THE CERVIX*

By PALMER FINDLEY, M.D.
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In following the progress made in research laboratories and clinics throughout the world we are bewildered by the endless array of theories advanced in the effort to evolve a plausible explanation for the origin of cancer. But when all has been said and done we come back to the generally accepted interpretation that long-continued irritation predisposes to the development of cancer. The essential cause of cancer is not yet revealed; perhaps it will never be. Says Francis Carter Wood:

"We may have to breed cancer out of the human race."

The recognition of precancerous lesions, their

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prevention and their early removal constitute our most encouraging approach to the problem. Especially is this true of cancer of the cervix because the cervix is peculiarly susceptible to trauma and infection. I am well aware that there are those who say that there is no such thing as a precancerous lesion, that a given lesion is a cancer or it is not a cancer, that it is not essential that there be a pre-existing pathologic change in the tissues in order that malignant changes may take place. To me it seems that the objection raised to the term "precancer" is purely academic. To my way of thinking, a healthy cervix is the surest safeguard against malignancy; a cervix that has been traumatized and has subsequently become infected, the infection penetrating to the deeper layers of the mucosa and persisting over a long period of time, may readily show tissue changes bordering on malignancy. It is difficult to understand how anyone who is familiar with the gross and microscopic pictures presented by erosions of the cervix and the endocervical changes can fail to recognize the potential factors which lead to malignant changes in the tissues involved. Ewing says that cancer arises only in tissues altered by chronic irritation. Clinically we are supported in our contention in noting how seldom a cervix becomes malignant after successful repair of injuries and the eradication of infection. Ninety per cent of all women with cancer of the cervix are multipara; of the remaining 10 per cent, a goodly proportion have suffered trauma and infection of the cervix. Graves repaired the cervix in about 5,000 cases and in a follow-up over a period of years only four of this number developed cancer. Personally, I have never seen a cancer of the cervix develop after repair or cauterization.

The endocervix is peculiarly susceptible to infection and the compound racemous glands, with their narrow outlets, harbor the infecting organisms. Bacterial and chemical irritants operating continuously over a long period of time tend to cause proliferation of the deep cell layers, thereby approaching the stage of malignancy. Once these cells become invasive, malignancy is established. Couple this invasiveness of the basal cells with the appearance of isolated clumps of epithelium with blunt or sharply pointed cell columns invading the underlying stroma, with irregular germ cells that stain unevenly and contain many mitotic figures, and we have all the known essentials of a malignant growth. Thus we see a continuous chain of events starting with a persistent infection engrafted upon a traumatized cervix and followed by cell proliferation and invasion of the underlying tissues. Pathologists differ as to what constitutes evidence of malignancy in borderline cases. There may be no invasiveness yet malignancy may be detected under a high power lens. This is demonstrated in the examination of scrapings where it is not possible to demonstrate invasion of the underlying musculature. Malignant adenoma may show no invasiveness. Epidermidization of the cylindrical epithelium may confuse the picture as they lie embedded in the stroma. In the process of healing of erosions squamous cells may rest underneath the superficial cylindrical epithelium and further confound the picture. All this speaks for the services of a competent pathologist in passing judgment upon borderline cases. In making his decision he will look to the individual cell characteristics, to large, heavily stained nuclei containing many atypical mytotic figures.

It follows that if inflammatory lesions within the cervix are potential factors in the development of cancer, prevention is our most dependable approach to the problem. The challenge is to the general practitioner who is doing the bulk of obstetrics. Clean obstetrics, the early repair of the cervix and the timely eradication of infection will go far in solving this pressing problem. I venture the statement that fully 80 per cent of all cancers of the cervix are preventable. Saltzstein-Topsic report 1,850 cases of endocervicitis that had been properly treated in which only 15 cancers developed in the cervix. On the other hand, there were 2,255 cancers of the cervix in which only 33 had received treatment for a pre-existing lesion in the cervix. It all sums up to this: we as physicians should become cancer minded, and in answer to criticisms of educational efforts among the lay public we do well to recall the words of Sir Becksley: "It is better to be scared than dead." An enlightened public in matters pertaining to the cancer problem is an obligation that rests upon the medical profession, and again I quote Sir Becksley: "By preaching the menace of cancer we are not scaring people to death, but rather we are frightening people into life."

Fortunately cancer of the cervix, by virtue of its accessibility, offers favorable conditions for early recognition and irradiation therapy. It was here that the therapeutic effects of radium were first demonstrated. Cancer of the cervix in its earliest stage is a microscopic, symptomless lesion. The surface is smooth, not elevated, and there is no change in color. When a little

further advanced the surface becomes slightly elevated above the neighboring epithelial surface, it pales in color and under magnification is seen to be somewhat wrinkled. It is here that the Schiller test comes into play. Schiller recommends a solution of one part iodine, two parts potassium iodide, three hundred parts water. The test is based upon the hypothesis that cancer cells contain no glycogen as do normal cells, that painting the surface under suspicion with an iodine solution will stain normal cells a mahogany brown in contrast with the grey of the malignant areas. But inasmuch as cancer cells are not the only ones that are free of glycogen, and hence do not take the stain, the test serves only to awaken suspicion of malignancy and calls for a biopsy. Cervicitis, erosions, leukoplakia and benign ulcers fail to take a deep mahogany stain, as do areas in which the epithelium has been dislodged through trauma. Leukoplakia remains grey, the other lesions take a light brown stain.

The size of the lesion is no criterion of the age of the growth. Schiller says cancer grows slowly in the earliest stage, that later on the growth is accelerated. It is in this period of comparative quiescence that the prospect of cure is greatest. But unfortunately the lesion is seldom recognized until symptoms arise and the disease is far advanced.

The prevailing impression that cancer is a disease of midlife and advanced age and seldom, if ever, occurs in the young is responsible for many failures in early recognition. Ludwig reported six cases of cancer of the cervix at 6 to 16 years of age and Parabuceu found 24 per cent of the cases in Russian clinics occurring between 20 and 30 years of age. He attributed this to artificial abortions and the abuse of contraceptives. I have seen an adenocarcinoma of the cervix in an infant of six months. It follows that we are not to be caught off guard in failing to bear in mind the possibility of cancer at any age. Youth bequeaths no immunity to carcinoma.

Because many factors determine the ultimate results of treatment it is not possible to evaluate the comparative merits of the various means employed. The extent of involvement is, of course, the chief factor and this cannot be determined with accuracy. We have no way of knowing with certainty how widespread the invasion and metastasis may be. I recall witnessing an autopsy in Wien in which the growth gave every indication of being confined to the cervix. It would have come under the classification of Group I, yet there was metastasis widespread throughout the body. Secondary to the size of the local lesion we are able to take into account the radiosensitivity of the tumor cells, but again we have no certain means of measuring the effect of the rays on a given cell structure. The histologic cell picture is not a constant factor; it may change from time to time, but in general it may be said that tumor cells of a highly developed character are of low malignancy and are most resistant to irradiation, and conversely embryonic cell types, with many mitotic figures in the cell nuclei, are highly malignant and sensitive to irradiation. Schmitz, Hueper, Arnold and others find a higher five-year cure rate in slowly developing, highly differentiated cell types than in rapidly developing, undifferentiated types. While the latter heal more rapidly, in the first three months following irradiation recurrences are more frequent and appear earlier than in the more differentiated types. Warren found only 4 per cent of metastasis in spinal cell types, 34 per cent in transitional cell types, and 67 per cent in spindle cell types. C. C. Norris says that in determining the prognosis we must also take into account the general condition of the patient, her age, and the blood supply to the tumor. All these factors must be considered in reckoning the ultimate prospect of cure, but it should again be emphasized that our chief reliance is on the size of the tumor and its evident spread, not upon an hypothetical grading of a biopsy specimen.

The classification of cancer of the cervix, devised by Henry Schmitz and somewhat modified by the League of Nations, serves well as a guide to diagnosis, treatment and prognosis.

Group I begins as a microscopic lesion and is limited to the cervix.

In Group II, one or more fornices are invaded, with or without a limited involvement of the parametrium. There is partial immobilization of the uterus.

In Group III, the parametrium is invaded to the pelvic wall on one or both sides. The uterus is partially or completely immobilized and there is invasion of the vaginal walls. Isolated areas of the pelvic lymph nodes may be involved and there may be metastatic areas in the vaginal walls.

In Group IV, bilateral, massive invasion of the parametrium extending to the pelvic walls, bladder and rectum are invaded, and there is remote metastasis.

Prior to the introduction of irradiation therapy, cancer of the cervix was regarded as a surgical lesion, but surgery left much to be desired because of the limited number of cases which came within the scope. A large proportion of the cases were not amenable to surgery. We owe much to the surgeons who have developed the radical operation. They have attained the limits of dissection within the safety zone and they have made notable gains in the cure rate. But their efforts have been attended by a high operative mortality. In the hands of skilled, experienced surgeons there is a primary mortality of 10 to 15 per cent. Victor Bonney reports an operative mortality of 9.5 per cent in Groups I and II, and this in the hands of one of the most skilled and experienced operators, who has performed more Wertheim operations than any living man. Bonney operated upon 63 per cent of all cases, thus excluding 37 per cent as not available for operation. He reports a five-year cure rate of 24.6 per cent and a ten-year rate of 18 per cent. "The value of the operation," says Bonney, "may therefore briefly be expressed by saying that on the five-year basis it cures 2 out of every 5 patients operated upon, and 1 out of every 5 patients seen." Bonney frankly acknowledges that surgery can do no more. "We can go no further in surgery, I am sure," says he, "whereas radiation has still, no doubt, an expanding future before it." He expresses the opinion that when radiation succeeds in destroying cancer in the regional glands it will entirely supplant surgery and adds: "One cannot look into the future, but I think it is quite possible that we shall one day see the end of surgery as a treatment of carcinoma of the cervix."

Irradiation therapy has passed the experimental stage and is all but universally adopted throughout the world as the most effective means of attacking cancer of the cervix. The results in operable cases equal that of surgery and in inoperable cases irradiation can do much to prolong life, relieve suffering, and a small proportion of cures have been effected, all this with a minimum of risk and discomfort. A glance at the records of several leading clinics speaks for the merits of irradiation therapy. Five-year cures were reported from the following sources:

	Group I	Group II	Group III
Regaud	75	50	23
Schmitz	80	41.9	16.4
Healy	76.1	42.8	26.8
Ward	62.5	55.2	22.6
Heyman, Groups I-II	44		

These results recall the statement of H. H. Bowing:

"Every case," said he, "is a challenge to the radium therapist, drawing heavily upon his skill and judgment, based on experience in the management of these cases, and equally on the equipment and facilities for treatment at his command."

And we ask: Can we expect further progress in irradiation therapy in the management of cancer of the cervix? Ward-Sackett report a gain of 5.5 per cent from 1925 to 1937. Healy-Frazell report that 70 per cent of the cases are advanced and hopeless, a gain of 5 per cent in the years 1928-1931. By a persistent follow-up system, attacking recurrent growths as they arise, Ward has attained a 27.4 per cent five-year cure rate, with a primary mortality of 1.8 per cent and a treatment mortality of 1.2 per cent. There were 708 cases treated from 1919 to 1937. This is relatively an excellent showing, but it leaves much to be desired. There is yet to be devised a technic that will effectively cope with widespread invasions and pelvic gland involvement. Failing in this, further progress will be slow and will come far short of the coveted goal.

While it is generally recognized that anatomical variations do not permit of standardization in irradiation therapy, it is of interest to note that the Radium-hemmet has consistently held to the Forshell method, with little variation, since 1913. They have adhered to the practice of giving large doses of radium (100-120 mg.) with heavy infiltration (equivalent to 3 mm. of lead) and never making more than three applications, with an interval of one week between the first and second applications, and a three-week interval between the second and a possible third application. The x-rays have supplemented radium in recent years. Radium needles have been inserted into the growth, but the main reliance is placed on intra-uterine and vaginal vault irradiation. A recent visit to the Radium-hemmet impressed the essayist with the magnitude of their work, their thoroughness and conservatism. In the thirteen years ending in 1937 there were 1,237 cancers of the cervix treated in the Radium-hemmet; of this number 259, or 20 per cent, remained symptom-free for five years. From 1914 to 1921 there were ten-year cures in 16 per cent of the cases irradiated. Ninety per cent of all cases were relieved of hemorrhages for a variable time, offensive discharges and pain were controlled in 50 per cent,

and in 60 per cent there were added days of useful occupation.

The usual technic of the Radium-hemmet is to administer a total of 7,000 to 7,200 mg. radium given in two stages at intervals of one week. Two tubes, each containing 25 mg. of radium, or one tube containing 38-43 mg., are inserted into the uterus. Against the tumor are placed 70-80 mg. cylindrical applicators of a caliber corresponding to a 7 or 8 Hegar bougie are used for intra-uterine application. Complications and other factors may alter the technic. They believe that more than 4,500 mg. hours endangers the rectum. Aged patients with atrophied vaginal walls and a small uterus call for guarded dosage. The larger the surface affected the greater the dosage. Combined radium and x-ray therapy is reserved for cases in which the parametrium is widely invaded. Isolated nodules in the vaginal walls call for needles together with surface applications in doses of 500 to 600 mg. hours. In the event of recurrence of hemorrhage after irradiation, hysterectomy is resorted to if local and general conditions permit. A developing leukopenia or lymphopenia calls for a restricted dosage. If the temperature reaches 102.2° F. in the course of the treatment, the radium is withdrawn until the temperature subsides. It is of interest to learn that the surgeons and gynecologists of Sweden do not favor radical surgery in cancer of the cervix and corpus save in the event of recurrence of bleeding after irradiation has been given a fair trial.

As in the Radium-hemmet so in the Munich Clinic combined x-ray and radium therapy is preferred to surgery. There is little difference in the final results of the two clinics. The same holds true of the Curie Clinic. There the necessity is stressed of distributing the rays equally throughout the invaded area and in doses that will destroy the malignant cells without doing violence to healthy tissues. Only in exceptional cases is the uterus removed after irradiation. Where there is great invasion of the growth or demonstrable infection, x-ray exposure precedes radium irradiation. Small amounts of radium are given over a prolonged period on the hypothesis that by so doing there is time for the damaged normal tissues to repair, and greater assurance of attacking the cancer cells in the mitotic stage. Regaud, of Paris, inserts 70 to 80 mg. over a period of several days until 7,000 to 8,000 mg. hours are attained. Heavy infiltration (1-1½ mm. of platinum) are used. The radium and packing are removed daily and the vagina cleansed to avoid infection. Ward stresses the value of needling the parametrium in the presence of evident involvement. Thus it will be seen that there is a wide variation in irradiation technic in the leading cancer clinics of the world, but with little difference in ultimate results. It seems evident that, as before stated, the one factor to be desired, and not yet attained, is the development of a technic that will cope with metastasis of the pelvic lymph nodes. Taussig removes these glands in borderline cases following irradiation. His results appear to justify this precautionary measure. He contends that the operation is not difficult in the hands of an experienced operator and is not attended by great risks to life. Says Taussig:

> "My experience of the past five years has convinced me that iliac lymphadenectomy in the hands of a competent surgeon, done upon patients that are good operative risks, with only partial cancerous involvement of the broad ligaments, is a relatively simple and harmless procedure and gives an increased chance of survival and cure that definitely justifies the surgical intervention."

Taussig records a primary mortality of 4.3 per cent. He found the glands involved in 46 borderline cases. His survival period was increased 100 per cent over irradiation alone. There is a tendency toward giving increasing doses consistent with the integrity of normal tissues. Taussig found 50 per cent recurrences where no more than 4,500 mg. hours were given as compared with 14 per cent following larger doses. Local recurrence is indicative of under-irradiation.

In Sweden radium has never been rented for use by doctors who lack experience in radiotherapy. This in contrast to the prevalent hit or miss custom in our country. Realizing that the best results in radiotherapy are obtained in clinics possessing large quantities of radium and manned by experienced radiologists, clinicians, physicists and pathologists, Sweden has concentrated on three clinics (Lund, Stockholm, Gotenburg) which serve the entire country. Roentgen therapy is practiced in a score or more of clinics in Sweden as an adjunct to surgery, but where radiotherapy is the procedure of choice the cases are referred to one of the three radium clinics.

Many cases are advanced beyond all hope of permanent relief. What can be done to prolong these lives and give added days of comparative

comfort? There are times when it is imperative to stop treating the cancerous growth, but there is never a time when the efforts of the physician should cease in affording relief from suffering. Pain, hemorrhages, and odorous, irritating discharges demand our utmost efforts at relief. For the relief from pain we may start with the salicylates and barbiturates and later resort to codeine and morphine, but all will be found to be short-lived in their effects. With this in mind opiates should be withheld as the last resort in medication. For the relief of intolerable pain that has resisted medication subarachnoid injections of 1 to 1.5 c. c. of 95 per cent alcohol may be substituted. The injection is made between the last lumbar and first sacral vertebrae, this to interrupt the pain pathway. Where the pain is referred to the sciatic and iliac regions such injections will usually give relief for several months, during which time drugs may be withheld.

Only when the pain is confined to the pelvis should presacral sympathectomy be performed. Cordotomy, in my judgment, is rarely, if ever, justified. We are to bear in mind that pain is due to a variety of conditions, to inflammation of the sacral plexus, to distention of the ureters and pelvis of the kidney, to neuritis of the parasacral nerves and to lumbar metastasis. Thus success and failure will be determined by the method pursued. High voltage pelvic roentgen rays will sometimes bring relief and are well worthy of trial.

For control of hemorrhage and odorous discharges the cautery and the x-rays are usually effective. The application of acetone to the vault of the vagina will often control the discharges for a prolonged period. With relief from distressing symptoms comes an improvement in the general well-being, additional weight is added and for a time the patient is encouraged to believe that she is on the way to recovery. All this is well worth-while.

Whether the patient should be told frankly her condition depends upon her emotional stability. In advanced cases there may be domestic and business circumstances that compel an understanding. Certainly there should be no concealment when the patient fails to cooperate with her physician. She should be encouraged to be up and about when her physical condition permits. This will serve to keep up her morale.

446 Aquilla Court

CHANGES IN OBSTETRICAL PROCEDURE DURING THE LAST THIRTY-FIVE YEARS*

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Since the beginning of the present century there have been many changes in obstetrical procedure, most of which have led to better care of mother and child. It is also true, however, that some of the changes suggested have been of such nature that many of our leading teachers have considered them too radical and have waited for further evidence before putting the stamp of approval upon them. The question is often asked, in what direction and how far have we gone, and it therefore seems proper to look backward for a few minutes and try to evaluate the present procedures by comparing them with those in vogue thirty-five years ago. What do you think would be the reaction of the splendidly trained young specialists who are being turned out every year by our many medical schools and hospitals if we told them that they were welcome to practice obstetrics in the places of their selection but only with certain restrictions? Suppose we said: "You can examine your patient's urine for sugar and albumin and even look at it microscopically for casts, but you must on no account take a blood pressure reading and, of course, all blood chemistry is out of the question. External pelvimetry is permitted, but the x-ray is dangerous and may never be used on a pregnant woman. You may, therefore, never employ this means of checking measurements, determining the size and position of the fetus or answering the question, often so important, of the number of children in utero. No Wassermann reaction can be taken and if your patient is known to have syphilis you can only treat her with inunctions of mercuric ointments and potassium iodide by mouth. When your patient is in labor you must never do a rectal examination and use no glove when making a vaginal, and all that you can do to relieve pain is to give a small dose of morphine sulphate or heroin hypodermically and carry out the chloroform technic suggested by Simpson over ninety years ago. Episiotomies are not in order, forceps must be used rarely and for certain definite indica-

*Chairman's Address, Section on Obstetrics, Southern Medical Association, Thirty-Second Annual Meeting, Oklahoma City, Oklahoma, November 15-18, 1938.

tions only, and cesarean sections are of the conservative type, only used in cases of disproportion except in the presence of frank infections when a hysterectomy may follow the removal of the child. Eclampsia can be treated only by radical methods (immediate delivery of the child, not by section), and placenta previa and premature separation of the normally implanted placenta must be handled by the use of a bag or by forceful dilatation of the intact cervix followed in either case by internal podalic version and extraction. Pyelitis during pregnancy or postpartum can never be treated because it is unheard of and if you have serious bleeding or shock or both you can give a subcutaneous infusion of salt solution, but never a blood transfusion. 'Dry labors' are terrible events and therefore inductions by rupturing the membranes are nothing short of criminal, but, if you must bring on labor for any reason, a bougie or a bag can be employed. Of course, the only way infections are to be combated is by supportive treatment of an uncertain type with possibly a laparotomy and the attempt to ligate thrombosed veins in the broad ligaments, and do not bother too much about isolation of the unfortunate and probably doomed patient."

But why continue? It is reasonably sure that our discouraged young physician would long since have thrown up his hands and decided to devote his efforts to a more profitable and less exacting field of medicine. It seems hardly to be believed that the above picture represents exactly the obstetrical situation in 1904, when the writer graduated. Well does he remember his first night on duty in August of that year at the Johns Hopkins Hospital in the service of the late Whitridge Williams. An outside call came in the early hours of a hot summer morning and after collecting his group consisting of a nurse and a senior student he departed tremblingly for the patient's home, only a few blocks away. It will always be a question who was the most scared member of the trio of supposed experts. The little house was reached without delay, a woman speechless with fright pointed up the stairs; a dirty, badly lighted bedroom on the second floor was entered and the physician and his assistants gasped in horror at the sight. A 16-year-old unmarried white girl lay unconscious on the bed with an eight-pound infant crying lustily between her thighs. The cord was still uncut and the placenta undelivered, and it seemed to the inexperienced eyes which gazed on the scene that the mother must have lost at least two quarts of blood. However, she was still alive, though pulseless at the wrist. A number of attempts were made to deliver the placenta by the Credé method, but all that was expressed was more blood clots, and after an hour, with the patient still breathing, a note was sent to the hospital with a request for assistance. The assistant resident finally arrived and, after certain sarcastic remarks about the uselessness of interns in general and the particular stupidity of the present company, he attempted in a lordly way to show how a third stage should be completed, but after working half an hour with no result except more bleeding, he decided the patient should be taken to the hospital for a manual removal of the after-birth. This seemed excellent advice, but as it took almost an hour to get out the ambulance in those days, the senior physician suggested that the writer and the student carry the patient the comparatively short distance necessary to the main entrance of the hospital and he would precede them and have a stretcher waiting at the door. In that plan he showed his good sense. The squalling baby was wrapped in a blanket and carried by the nurse; the father of the almost dead patient took care of the obstetrical bags and the unfortunate intern and the student, after covering the unconscious young mother as well as possible, started up the street walking abreast, carrying the limp body across their flexed arms. She weighed over one hundred and sixty pounds and after two blocks the going became pretty hard. By this time it was broad daylight, the cover had slipped entirely off the patient and the cord was flapping in the morning breeze, leaving a steady trail of blood behind. The carriers became exhausted with over a block to go and squatted down in the street with the body across their knees. At that critical moment a husky workman came up Broadway; he was frantically hailed, got in between the played-out M.D.'s and the party staggered up to the door, where the wise assistant resident was waiting with a welcome stretcher. The patient, still alive, was rushed back to the maternity ward, put upon the operating table and the placenta dropped out. In spite of the success of this method of treating the third stage it is not to be recommended, at least for beginners, but to paraphrase Kipling slightly, "we learned about women from 'er," and as she made a good recovery it occurred to the writer that some patients at least are difficult to kill either by ignorance or inexperience, and his morale was considerably bucked.

During 1904 and 1905 the obstetrical staff of the Johns Hopkins Hospital were doing some interesting work along the lines of the advancement of knowledge. It is pleasant to look back at that small group of men, all young, enthusiastic and ambitious and all entirely under the guidance of their incomparable chief, that great clinician, teacher and author. It would be hard indeed to convince "a Williams man" that a greater obstetrician ever lived than he, and how proud he was of his boys, as he called us, and what real pleasure it gave him when they accomplished something worth while and received recognition from other centers of teaching. To the writer, those golden days of youth are indeed a precious memory. Assisting the Professor was a carefully selected group consisting of J. M. Slemons, now of Los Angeles; Herbert Little, formerly of Montreal, whose untimely death a few years ago was a terrible blow to his many friends, and F. C. Goldsborough, now living in Buffalo. The first edition of the Williams textbook had appeared late in 1902 and it stimulated a renewed interest in the teaching and practice of obstetrics. Little was working on the bacteriology of infection, Slemons on the classification, etiology and chemistry of toxemias and Goldsborough was attempting to provide an instrument suitable to take blood pressure at the bedside. Your Chairman had a case that first called attention to the importance of trying to measure the diameters of the pelvic outlet and he also had the good fortune to assist Dr. Williams when he did the first pubiotomy ever performed in Baltimore, and to assist Little at the initial operation of vaginal hysterectomy in the Clinic. In those days cesarean section was a rare event and the first one during the term beginning September 1, 1904, was not done until just before Christmas of that year. It is interesting to recall that on that memorable occasion, in the cold gray dawn of a winter morning, the whole hospital staff, including the nurses, crowded the operating room to see this spectacular and unusual procedure. During these days also the foundations of proper prenatal care were being laid and studies on the normal and contracted pelvis were instituted. In 1906 a man was sent to Freiburg in Baden to investigate the so-called twilight sleep technic and attempts were made without much success in our hospital to relieve some of the discomforts of the first stage of labor. Eclampsia was particularly deadly then and the maternal mortality was undoubtedly increased by the radical treatment that was then considered essential, namely, the immediate delivery of the child through the normal channels no matter what the condition of the cervix or of the patient. The vaginal hysterotomy above referred to was done, of course, in one of those cases and pubiotomy was undertaken in order to give patients with borderline pelves a test of labor, as it was known even then that the usual conservative section was particularly dangerous if the patient had been long in the first stage. Cultures were taken from the lochia of infected women by the Little technic, but nothing much was suggested as to curative treatment. However, the value of prophylaxis was quite well understood and measures of this kind were employed, although caps and masks were not used in the delivery room and gloves only in hospital cases. The dreadful results of syphilis in pregnancy were fully appreciated, but the treatment, such as it was, was entirely inadequate, nor could the disease be recognized except by external lesions when they were present. It is the firm belief of the writer that nothing finer in prenatal care has ever been done than the insistence upon routine Wassermanns in all patients, both ward and private, and the giving of modern antiluetic treatment, when necessary, to expectant mothers. No one can estimate the untold thousands of babies who have been saved by this means from death or from a fate worse than death; and the number of ghastly domestic tragedies once common which are now avoided. It is pleasant to remember that the work and influence of Williams was largely responsible for this outstanding achievement.

Placenta previa was always treated by the bag or balloon in those early days and premature separation of the normally implanted placenta by forceful dilatation of the cervix, followed by version and extraction. Sections were never done for these indications. Labor was induced rarely and always by the introduction of a bougie, rupture of the membranes being considered dangerous. Pyelitis was unrecognized, newborn eyes were given the Credé treatment and babies always had breast feeding and were nursed every two hours. The drying up of the breasts was painful and a long drawn out process which required the application of pounds of belladonna ointment and frequent pumping of the tender organs. About this time it was suggested to the Professor by a country physician in Rhode Island that if the breasts were let alone they would dry up without trouble and with a minimum of discomfort. It was indeed a happy day for the Clinic when that technic was started; also the rectal examination during labor was

substituted for the sterile vaginal about 1907, and what a trouble saver that simple procedure was. The x-ray was never used until quite recently, as it was then considered dangerous for the unborn child.

A great quantity of amniotic fluid has passed over the Kelly pads during the last two decades, and where are we now? The attempt to relieve the pains of labor is surely a practical problem of the first importance and deserves serious consideration, but it appears to some of us that the relief of pain and its total abolition are two entirely different matters. The first can be accomplished with reasonable safety for mother and child, but the second requires large doses of powerful drugs either by mouth, hypodermically or by rectum, possibly by a combination of all three, and deeply asphyxiated babies are unfortunately frequent enough. Most of the infants come back, it is true, following the use of proper measures, but some of them do not. The problem is mainly that of controlling first stage pains, since the proper use of gas, oxygen and ether in the second stage is now well established and has stood the test of time. The writer is particularly interested in this method, as he was privileged to give the first gas-oxygen anesthesia ever given in Baltimore to a patient in labor in 1915, following the technic of Davis, Lynch and Webster, then working in Chicago. It is his (the writer's) opinion that the ideal drug or combination of drugs for use during the first stage has not been arrived at and that we must proceed with extreme caution in this most important matter and not jump at conclusions after reports covering a comparatively small number of cases. Unfortunately the lay press and popular magazines have decided this question for us and have seriously undermined the morale of the younger generation of potential mothers who now refuse to accept any pain whatever and demand the employment of powerful and dangerous drugs which I fear we are often forced to use against our better judgment.

The indications for cesarean section have been greatly increased in the past decade, and rightly so, and we now believe it should always be done in premature separation of the normally implanted placenta and in most cases of placenta previa, especially when the patient is a primigravida. The work of Bill, of Cleveland, in this connection is outstanding. There are a number of other conditions in which section is indicated which doubtless occur to you and are entirely proper, but the speaker is strongly of the opinion that far too many of these major operations are being done and thereby lives are needlessly sacrificed. Even in the best hands cesareans are not free from risk and one must always remember that there is a 4 per cent possibility of rupture of the uterus in future pregnancies; therefore, we should be particularly careful in starting out a young woman on her reproductive career with a scar in her anterior uterine wall. C. H. Peckham has recently reported the analysis of four hundred maternal deaths in Maryland outside of the City of Baltimore and the casualties following sections are second only to those resulting from infections. Reports such as this should give us food for serious thought. Of course, the low cervical operation which has properly displaced pubiotomy is an excellent procedure when correctly used, and can be employed with fair safety following a long test of labor. It is also felt that the danger of subsequent rupture is decreased following this type of operation.

Induction of labor by rupture of the membranes is now widely used and if the patient is at term it works well except in those women who are classed as "grand multiparae," but we are convinced that the procedure should be employed only when there is a definite indication for the termination of pregnancy and not for the so-called convenience of the patient and, I suspect, of the physician as well.

The prophylactic forceps following a deep episiotomy is much in vogue and possibly this technic may turn out to be the proper procedure for the delivery of all primiparous patients. Of course, one has to remember, as Watson and others have pointed out, that any instrumentation increases the risk of infection, but the preservation of the pelvic floor may well balance this. The final answer has not yet been reached. The artificial dilatation of the cervix, however, followed by version and extraction, to save the patient from the pain of labor cannot, in the writer's opinion, be too strongly decried.

The x-ray in obstetrics is just coming into its own and is proving more valuable almost daily. Checking of the pelvic measurements and even estimating the size of the fetal head is, of course, well known, but the so-called soft tissue technic by which the placenta can be definitely localized and the uterine wall examined for defects is quite new and no one knows what the end will be. The treatment of eclampsia is still far from satisfactory, although the maternal death rate (but not the fetal) has been reduced markedly by

more conservative methods, namely, treating the mother and not attempting to deliver the child until the second stage has begun. Surely the figures seem to prove also that cesarean section done during the eclamptic attacks definitely increases the maternal death rate.

One of our major problems is infection and the results of treating it are disappointing in the main. The number of infections has been definitely reduced by proper hospitalization of the patient, the wearing of caps and masks in the delivery and operating rooms and the careful bacteriological examination of the mouths and throats of the attendants. Of course, all patients who develop a suspicious temperature should be isolated as thoroughly as possible. The curative treatment is not what we would like as far as results are concerned, although the use of frequent small transfusions and the giving of sulfanilamide has been encouraging and, by the way, the latter drug seems to have a definite place in the treatment of severe cases of pyelitis caused by the colon bacillus. Of course, sulfanilamide must be used with great caution because of its toxic effects. Also we have learned a great deal about the resuscitation of newborn babies since the relief of pain campaign got under way.

Summing up, it can be safely said that we are making definite progress in the right direction, although the journey has been long and slow and the end is not in sight. What a pity it is that often when we have lived and practiced long enough really to profit by past experience, and there is nothing that teaches one more if properly guided, just when we begin to be of some value and are possibly getting a little cocky about it, there is a slight tap on the shoulder and standing behind us is a little old man with a long beard and a scythe, grinning sardonically and beckoning us to follow him. Of course, then there is nothing to do but to depart with as good grace as possible.

When that great Englishman, Cecil Rhodes, lay dying in the midst of that empire in South Africa which he had added to the British dominions beyond the sea his last words are reported to have been "So much to do, so little time." There are still many major problems in our specialty which are yet unsolved. The etiology, classification and treatment of the toxemias, especially eclampsia, the safe relief of the pain of labor, the cause and prevention of placenta previa and separation of the normally implanted placenta with their accompanying serious hemorrhage, the proper handling of breeches and occiput posteriors, and the terrible and tragic problem of infection, to mention only a few. Who is going to answer these all-important questions and be the means of saving the lives of millions yet unborn? The moments are ticking off, the months and the years are passing, the sand for many of us is getting low. "So much to do, so little time."

1014 St. Paul Street

COOPERATIVE OBSTETRIC DELIVERY SERVICE BY PRIVATE PHYSICIANS AND COUNTY HEALTH DEPARTMENTS*

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In communities with well organized public health departments, the medical and nursing services have done much to improve prenatal and postnatal care of patients. There is little doubt that concentration on problems pertaining to pregnancy has improved maternal and infant morbidity and, to some extent, mortality.

Physicians in these communities may have thought that public health care would take practice from them, but this has not been the case. Rather has the public health department increased the number of patients referred to physicians, for there has been a definite effort to place all maternity cases, particularly complicated ones, under the care of private physicians. At the same time, the great majority of patients cared for by public health departments is of the indigent group, and it has been difficult to get many of them in the hands of private physicians or to give them as complete care as is consistent with good medical practice.

Intensive studies of maternal and neonatal care have been made in two counties† in different states during the past few years. Current practices were investigated regarding the ante partum and postpartum care of women by private physicians, midwives, and the full-time health departments. Maternal and neonatal deaths and stillbirths were analyzed.

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*Read in Section on Public Health, Southern Medical Association, Thirty-Second Annual Meeting, Oklahoma City, Oklahoma, November 15-18, 1938.

†Gibson County, Tennessee: Study of Maternity Care in Gibson County. Jour. Tenn. Med. Assn., **28**:—, No. 6 (June) 1935.

†Pike County, Mississippi: Maternity Care in a Rural Community. The Commonwealth Fund, New York, 1938.

Of course, one would expect that among those patients who received both medical care by private physicians and supervision by the public health department nursing service, there would have been a lower mortality rate than among those groups not receiving this type of care or supervised by only one medical agency. This was, generally speaking, the case, as is shown in *Table 1.*

Table 1

PIKE COUNTY, MISSISSIPPI
1931-1936
Deaths per 1,000 Births

	Supervision	No Supervision
Maternal deaths	7.1	7.4
Stillbirths	31.1	36.6
Neonatal deaths	32.4	35.2

GIBSON COUNTY, TENNESSEE
1931-1933
Deaths per 1,000 Women

	Supervision	No Supervision
Maternal deaths	6.0	7.9
Stillbirths	21.4	36.4
Neonatal deaths	31.7	33.3

One might conclude that greater improvement could be obtained by increasing the numbers of patients under health department supervision, thereby further decreasing the deaths incident to pregnancy. This seems logical, since *Table 2* shows that by no means are all pregnancies in the two counties supervised.

Table 2

GIBSON COUNTY, TENNESSEE
1931-1933

	Number	Percentage
Total births	2,817	
Supervision	1,167	41.5
No supervision	1,650	58.5

PIKE COUNTY, MISSISSIPPI
1931-1936

Total births	4,795	
Supervision	1,416	29.5
No supervision	3,379	70.5

However, it would require a very much larger staff to care for all pregnancies in the two counties, the expense of which would probably be prohibitive and would also, no doubt, greatly unbalance the general public health program.

In the more recent study made in Pike County, Mississippi (1937), it was found (*Table 3*) that in six years, 752 deliveries were conducted by physicians and also received public health department nursing service. Seven maternal deaths occurred in this group, making an incidence of 9.3 maternal deaths per 1,000 births. During this same six-year period there were 1,864 deliveries by physicians of patients who were not supervised prenatally by the health department nursing service, with a total of 17 maternal deaths, making an incidence of 9.1 deaths per 1,000 births. During this period of time there were 21 stillbirths among that group delivered by physicians and seen by the health department, with an incidence of 27.9 stillbirths per 1,000 births, while among those deliveries by physicians not under health department nursing supervision there were 62 stillbirths, making an incidence of 32.7 stillbirths per 1,000 births. There were 17 neonatal deaths among those patients who were delivered by physicians and who were under health department supervision, with an incidence of 22.6 neonatal deaths per 1,000 births; and for patients attended by physicians, but not under health department supervision, there were 83 neonatal deaths, making an incidence of 44.5 neonatal deaths per 1,000 births not under supervision. Public health supervision, apparently, lowered the stillbirth rate and the death rate among mothers to only a small extent, but lowered the neonatal death rate to an appreciable extent. However, all the death rates just enumerated are too high.

Table 3

STILLBIRTHS, MATERNAL AND NEONATAL DEATH RATES UNDER CARE OF PHYSICIAN
PIKE COUNTY, MISSISSIPPI
1931-1936

	Under Health Department Nursing Supervision	No Health Department Nursing Supervision
Maternal deaths per 1,000 births	9.3	9.1
Stillbirths	27.9	33.2
Neonatal deaths	22.6	44.5

It seems evident that something else might be done besides concentrating on ante partum and postpartum care if the incidence of deaths in these groups is to be lowered.

In both communities studied, 15 per cent of the maternal deaths in one county and 58 per cent of the maternal deaths in another were preceded by some type of operation among those delivered in the home. In one county all stillbirths occurring in mothers who subsequently died were delivered operatively. Added to this, the fact that several puerperal infections caused mater-

nal deaths alone or following operative delivery, one might rationalize that the labor and delivery period of the puerperal state should be more carefully managed in an effort to control factors contributing to maternal and infant death at this time.

In reviewing the chief causes of maternal death in the two groups of patients, it appears then that the management of labor and delivery had a definite bearing on a fair percentage of the maternal and fetal mortalities.

Physicians practicing in rural areas have been handicapped for years in managing their home deliveries because of lack of assistance and equipment. Fees have been so small that the doctors could ill afford to supply the necessary clean and sterile equipment, and many physicians have not always been as careful as possible in considering this part of their work. Consequently, patients have been delivered under very poor conditions, and the physicians have had to make the best of an impossible situation, either because of lack of ingenuity on their part or because of poor cooperation or lack of preparation on the part of the patient.

With this in mind, it would seem that the next step might be the improvement of delivery service to patients in a community.

Although midwives attend some of the deliveries in both counties, 10 per cent (approximately) in Gibson County and 45 per cent in Pike County, it seems logical that a delivery service should be offered only to doctors. An intelligent type of cooperation certainly could be expected and, if it could be shown that a cooperative delivery service by the private physicians and health departments lowers the death rate of pregnancy, then means should be found to increase this service to the elimination of midwife practice.

There is no question that assistance given to the doctor at this time would allow him to improve his management of cases materially, and therefore an improvement should be reflected in the lowered incidence of maternal and neonatal mortality and stillbirth.

This would also be a means of rendering a great service to the physicians in a community, thereby giving the profession tangible evidence of assistance by the health department without having them feel that the health department was encroaching upon their practices.

In spite of the fact that organized public health work is supposed to be a service given universally to all people, actually the great majority receiving benefit from health departments is among those of the poorer economic classes. Therefore, a home delivery nursing service to assist the physician can easily be given to all economic classes without that service being considered in any way a charity service, since all tax payers actually help to support the public health department.

This type of service should also increase the amount of prenatal care which is given, because only those patients who are actually registered for delivery will be able to take advantage of the delivery service and, as this service becomes better known in the community, every patient who cannot afford a private nurse will probably make an effort to qualify for the delivery nursing service by registering through her physician for prenatal supervision by the health department.

In a sense, it might seem as though coercion were being used to register patients with the health department, but actually it is the only way that the patients can be well supervised, and means only that the health department would carry out the orders of the physician on his private patients over a longer period during pregnancy than is now being done. The health department nurses would also do whatever prenatal check-up seems necessary if the physician is not able to see the patient regularly during the prenatal period. The patient is the one who will profit most by this cooperative service.

In both counties where nursing delivery services have been established, the physicians were first approached in their society groups to get their reaction to such a program and, ultimately, their sanction. In both instances unanimous approval was given to the plan by the physicians in a body.

Organization of Program by Health Department.—A considerable amount of time had to be spent in completing the organization of the program by the health department in the two counties. Obviously, in the average health department, the number of nurses regularly employed for generalized service would not be sufficient to carry on a delivery service, and it has been necessary to add two nurses to each of the two staffs following the inception of these delivery services. It should in no way interfere with the generalized service of the health department, because all nurses who are on the staff are assigned to do a part of the delivery

service, and no parts of the previous generalized program have been deleted.

A system had to be developed so that each nurse who is on call for the day or period of first call for delivery service would be relatively free from definite general duties, although she may do some work in a current clinic where she could be easily reached by a physician. A plan had to be made whereby the nurse who had been on a period of call for delivery service could subsequently have time off to compensate her for the continuous time on duty. Charts have been made for several months in advance, designating when each nurse will be first or second on delivery call and when she has time off duty.

Before these services began, some members of the nursing staffs took special obstetrical nursing training in well-known obstetrical clinics to supplement their general nursing knowledge. They, in turn, are supposed to instruct the remaining nurses in procedures they have learned until the time when all nurses can have special training. This will make for much better technic at the time of delivery.

Incidentally, there may be nurses in public health work who do not care to do bedside nursing, and therefore it may be necessary to make changes in staff appointments in order to have an entirely cooperative and interested staff.

These services, of course, have been set up by the health departments to supply the necessary equipment for a sterile delivery. In setting up such equipment it was necessary for the health departments to have sufficient supplies bought, made and always on hand to anticipate several deliveries. Arrangements had to be made to have the equipment sterilized, and sterilizers were bought for this purpose in both county health units. In view of the fact that these health departments have made the effort to put on such a service, it is little wonder that the physicians in these communities have been extremely cooperative in helping to make the service run well.

Cooperative Service by Physicians.—Certain regulations have been laid down for the physicians to adhere to, but they are only rational and not all stringent. The service is open to every practicing physician in the county and to his patients who live in the county. He must register his patients with the health department approximately before or during the fifth lunar month of pregnancy. Complicated cases are exceptions and obtain nursing service even though they have not been registered for the service, upon the advice of the health officer. The doctor cannot leave the case in charge of the nurse, for this not only makes her assume too much responsibility, but may prevent her from doing work in a clinic while she is subject to labor call.

The effort should be made to develop technic so that the actual set-up for delivery will be aseptic. This would necessitate not only special training for the nurse, but increased attention to technic on the part of the physician. In many areas physicians have been so long without assistance at delivery that their technic may have suffered, and efforts should be made on the part of those physicians to be as careful as possible in developing an excellent technic. The nurses undoubtedly can greatly assist in improving delivery room technic in the home by making it easy for the physicians to have the necessary equipment, as for instance, sterile gowns and gloves, and sterilized drapes for the patient, as well as gauze and cotton sponges, along with a minimum of sterile instruments.

There is no question that a high type of delivery service can be given in the home. In the past, home delivery has been rather poorly done, and this may have been the cause of complications, if not actually the cause of some maternal and infant deaths. It is hoped that by greater attention to the patient during the course of labor and delivery a great many unnecessary operative deliveries can be avoided, and that by the improvement in technic fewer puerperal infections will occur.

Although this service has been running for only a short period of time, it appears that the doctors and nurses in both counties are, in the main, appreciating it very much.

In Gibson County, where the service has been established for about a year, there have been 375 deliveries. In Pike County, although the service hos been established for only five months, the nurses have assisted at 68 deliveries in four months, and about 100 cases are registered currently for future delivery service. The nurses have spent an average of four hours on each case, so it appears that this new service is not detracting from the generalized health department nursing service.

Until the service can prove itself worth-while in saving lives, we should not overlook the fact that the physician's work is being made easier and his facilities are improved. Even more important is the fact that most patients using this service are experiencing more comfort and better care than they have ever had.

SUMMARY

(1) Reasons have been shown why a delivery nursing service may improve maternal conditions.

(2) Some details of the organization by a health department for such a service have been covered.

(3) Regulations to be carried out by the physicians using this service have been given.

(4) Evidences of the apparent success of the cooperative service are presented.

(5) Too short a time has elapsed to determine the value of the service in saving lives.

DISCUSSION (*Abstract*)

Dr. Thos. Purser, Jr., McComb, Miss.—Dr. Lapham is thoroughly familiar with obstetrical service in Pike County, Mississippi, for it was he who made the intensive study mentioned in the paper he has just read. After this study was completed he included in a list of specific suggestions regarding nursing service in the health department the following: "Because of the relatively high incidence of maternal mortality and morbidity from infection following delivery, and the continued high incidence of toxemia complicating labor, nursing service *at delivery* should be provided as an aid to the doctor." This has been done in our county.

In our cooperative delivery service the private physician is in full charge of the case from the time he first sees the patient until she is discharged. The public health service has the same relation to the physician as the staff of a military tactical unit has to the commander of that unit. The commander has the full responsibility, but the staff assists him in carrying that responsibility to the most successful termination possible. This is as it should be and is what the private physician desires.

Without attempting to detract in the slightest from the tremendous importance of prenatal care, all must agree that labor is the crucial period or climax of pregnancy and that prenatal care is simply a means of preparation for labor. Why, then, should the public health department not come to the aid of the physician and the patient at the time of the greatest need?

It is still too early to have any statistics of value regarding the effect of this service on the mortality and morbidity rates, but it is confidently expected that there should be some improvement. Since both the fatalities and the morbid cases are frequently those requiring operative deliveries, the final results here will still depend on the skill of the physician, but the nursing service makes him far more able to use his skill to the best advantage. He can deliver patients in the poorest homes with many of the advantages he would have in the hospital and none of its disadvantages. He is relieved of the necessity of instructing untrained assistants as to their duties as labor progresses and his mind is freer to concentrate on his own work. He has equipment provided by the health department and handled by the nurse such as I have never seen available in a home delivery before. All these things aid his confidence in himself and relieve him of certain distasteful parts of the patient's preparation, which he would possibly neglect if no skilled assistants were available. In fact, if the patient were not bettered at all by delivery nursing service, I am sure that the physicians of Pike County would clamor for its continuation because of the convenience, saving of trouble, and general satisfactoriness to them.

Table 3 of Dr. Lapham's paper shows that the most significant difference in mortality rate favoring public health department supervised cases occurs in the neonatal period. Admittedly, the most important part of the neonatal period is the time immediately after birth and the danger lessens with each hour of life. It appears, then, that supervision of the newborn infant should be begun immediately if the nurse is to aid in its care at all, and it is in this period that the nurse often is most valuable. With the delivery service, care is complete from early pregnancy to completion of the puerperal and neonatal periods and the chain is not broken at the time when help is needed most.

That this service is being well received by the laity is proven by the fact that frequently a patient on her first visit to her physician's office inquires about it and requests that she be registered even before it is mentioned by the physician. Favorable reports have traveled rapidly from mouth to mouth and, of all public health services in the county, this one is doing more to popularize public health work than any other. Those quickest to praise it are the mothers who have had previous home deliveries and grandmothers who have been present at such deliveries many times, the latter being those who would be the first to offer adverse criticism if they had any.

It is perhaps needless to say that only the very best type of most efficient nurse will be able to put this service over successfully. A prime requisite in her make-up is tact. Her presence during deliveries is a strong stimulus to the physician to exert every effort toward making his technic, particularly with regard to asepsis, as nearly perfect as possible, and to avoid certain laxities which have possibly cropped up from time to time in the past.

During the first four months that the service was available it was used on fifty-three white cases and fifteen colored cases, making a total of sixty-eight. It is being used by twelve of the fifteen physicians who do obstetrics in the home. The remaining three are using the same regularly employed assistants that they have used in the past. Estimates indicate that 70 per cent of all home deliveries in the county which are attended by physicians also make use of this service.

The nurse, during the later prenatal period, sees that the patient makes ready the house and provides boards to go under the mattress and blocks for elevating the bed. The kits carried by the nurse are completely equipped, even including bedpan and enema can, catheter, tracheal catheter, head stethoscope, sterile gowns, gloves, drapes, towels, sponges, cord ties and dressings, caps, masks, basins and, last but not least, a serviceable electric battery lamp.

I have only praise to offer the cooperative obstetric delivery service.

Dr. E. P. Bowerman, Trenton, Tenn.—My remarks will refer almost entirely to the home delivery service as it operates in Gibson County. Dr. Lapham has outlined the general plan of service. It suggests several subjects for comment.

As a kind of by-product of the program, is the in-

formation which is gradually accumulating in the record kept of each delivery call. When Dr. Lapham returns to Gibson County, as I hope he will return, to resurvey the obstetrical practice there, he will find much more exact and detailed information on which to base his conclusions.

As to the equipment carried by the nurse: in addition to the usual drapes, gowns and gloves required for a normal labor, a certain amount of emergency equipment is provided. This includes uterine packing, a tracheal catheter, and a glucose intravenous set. Ordinarily, all medication used is furnished by the physician, but epinephrine, caffeine, pituitary extract and ergonovine, as well as sutures and needles, are always carried in reserve. This is well, as in the instance when the physician entered a home with only his forceps in his hand.

In contrast to Dr. Lapham's remark that services of the health department usually benefit the indigent, one of our major problems now seems to be some way of getting the poorer and less well-informed group of mothers under this type of supervision. The delivery service has been used most extensively by the comparatively well-to-do and better educated families.

From November 1, 1937, to November 1, 1938, the public health nurse assisted the doctor in 375 home deliveries, slightly less than half of the deliveries occurring in this period. From this experience, I would like to summarize briefly the situation as I see it in relation to the health department.

First, as regards the staff and the remainder of the public health program: it has brought a new and more strenuous type of duty to public health nursing, one that is at times unpleasant because of night duty, bad roads, poorly heated homes and so on. That recent graduates in public health nursing were interested in the program and applied for positions in Gibson County was gratifying and made the few necessary staff changes easy. At present there is no unusual unrest or dissatisfaction on the nursing staff. The routine work has been planned around the schedule of the nursing service, and interference with other activities seems to be slight.

Second, the effect of the service upon the relationships between the health department and the practicing physicians of the county: on the whole it seems to be more popular with the physicians than any other service which the health department renders. Criticisms of the regulations have been few. The most frequent one is that those patients who need the service most are the ones who are denied it because of failure to register for prenatal supervision by the fifth month of pregnancy. That this defect has its compensations seems to be evident from the doubling of prenatal visits to private physicians and the larger percentage of expectant mothers receiving prenatal care. Postnatal visits to physicians and postpartum examinations also are increasing.

It is readily apparent that here the physician can serve his patients with excellence more in keeping with his training and ability. His relationship with the patient is strengthened. Naturally this promotes harmony between the physicians and the public health department.

Third, apparent benefits to the patient and reaction of the public: we are waiting with interest for pregnancy to recur in women who have already used the nursing delivery service. The reactions of these expectant mothers will be the final word as to whether or not patients have appreciated the service and whether it has had its intended educational value. From replies to a questionnaire and spontaneous remarks, it seems that the help of the nurse is highly appreciated by the patient and patient's family.

It is too early to draw conclusions as to the effects, if any, upon maternal, and neonatal deaths and stillbirths. To date no maternal death has occurred in this group of mothers who have had 4 months prenatal supervision and the delivery service. There have been 13 stillbirths and 7 neonatal deaths. From a review of specific cases it seems most probable that some lives have been saved through nursing assistance and equipment furnished.

Another improvement which cannot be measured quantitatively but which I am sure has occurred, has taken place in the obstetrical technic. The presence of a nurse trained in obstetrical duty almost certainly stimulates the physician to give his best consideration to operative interference and to strive to maintain aseptic technic.

Lest any of my remarks may have seemed self-congratulatory, I would like to explain that plans for the delivery service had been completed by Dr. F. L. Roberts, my predecessor as health officer, the physicians of the county, members of the State Health Department, Dr. Lapham and others, before I became actively concerned with the administration of the Department. That the service has passed its first birthday with harmonious relations among the doctors, nurses and patients and with some evidence of fulfilling its purpose, may be credited to careful planning, capable nursing supervision and excellent cooperation of staff nurses and private physicians.

Dr. T. Paul Haney, Jr., McComb, Miss.—As Health Officer in Pike County I am well pleased with the Home Delivery Nursing Service program. Our public health nurses like the work and say they would not change. None asked for a transfer when the work was started.

You have heard an expression from a private physician in the county who uses the service. All of the physicians like the service. During the fourth month, nurses assisted in 70 per cent of all home deliveries attended by physicians. Three physicians have their own private nurses whom they use and have used for the past several years. If we include these physicians we find that during the month of October, which was the fourth month the home delivery nursing service was in operation, over 90 per cent of all home deliveries had a trained nurse assisting the physician.

I feel that this is a most valuable service and that soon it will be included in many health department programs. I want to emphasize that this service should be considered only after a well-organized public health program has been established in a county. It cannot succeed otherwise.

Dr. Lapham (closing).—In answer to the question concerning the time the nurses are to be on duty: nurses cannot watch cases alone during labor; they must come and leave the case with the physician. This provision was made to prevent doctors from expecting the nurses to watch the labor cases indefinitely. It also allows the nurses to be occupied with their general public health nursing duties while tentatively on delivery

call. These services were established primarily to insure better delivery service and not to relieve the physician of his responsibilities in respect to labor.

I want to thank Drs. Bowerman, Purser and Haney for their interesting and constructive discussions, and the Section on Public Health for the general interest manifested in this new and important service. The influence of this service should be felt eventually in the improvement in maternal morbidity and mortality.

PUERPERAL INVERSION OF THE UTERUS*

By M. PIERCE RUCKER, M.D.
Richmond, Virginia

The incidence of puerperal inversion of the uterus varies tremendously, according to the statistics usually quoted. According to Ferri and Lorini, it occurs once in 1,440 cases, and according to Zangemeister once in 400,000. It is usually stated that this tragic accident occurs not more than once or twice in the experience of most physicians. As the result, we get conflicting ideas as to its etiology, symptomatology and treatment. From the textbooks one gets the impression that it follows mismanagement of the third stage of labor, that it is attended by profound shock and hemorrhage and that it is best treated by immediate replacement or by some modification of the Spinelli operation if replacement be impossible.

Recently there have appeared in the literature reports based on groups of cases instead of single cases as heretofore and the reports of these authors are somewhat at variance with the usually accepted ideas. Das,[5] in India, reported eight cases, four of obstetric origin, Manzi,[15] in Italy, 5 cases, and D'Errico,[9] of Boston, 11 cases. In 1933, Davis,[6] of Brooklyn, reported 4 cases, two sudden or expulsive in type and two that he calls acute delayed or gradual. In all his cases pituitary extract was given before and after the delivery of the placenta. He also cites a case of rupture of the uterus in which not only the fetus and the placenta were found in the abdominal cavity, but the uterus was completely inverted through the old line of incision. In another case there was some delay in closing the incision in the uterus. Pituitary extract was given and a complete inversion of the uterus occurred through the incision. He feels that strong oxytocics play an important part in causing this accident. In 1934, Barrows[2] reported five cases from Bellevue. All cases recovered, but one patient on whom a Spinelli operation was done died from rupture of the uterus at her next pregnancy. He is of the opinion that immediate replacement of the puerperal uterine inversion is frequently attended by considerable shock and is a dangerous procedure. The prompt treatment of shock is more important than attempting to replace the uterus when the patient is in doubtful condition. This year Brett,[3] of Melbourne, Australia, reports seven cases and reviews Davis' and Barrows' series. He puts down as causes:

(1) Too vigorous massage of the relaxed uterus.
(2) Routine use of pituitary extract.
(3) Traction on the cord with the placenta attached to the fundus.
(4) Manual removal of the adherent placenta.
(5) A submucous fibroid.

The most outstanding symptom was shock out of all proportion to the amount of blood lost. Surprisingly, not a single case died of sepsis, although in some instances the inverted uterus was expelled into a bedpan. He concludes that the patient should be treated for shock and the inversion should be ignored for the time. Involution takes place quite normally in the inverted uterus and in three instances a spontaneous reinversion occurred.

CASE REPORTS

Case 1.—(Previously reported by Dr. Mason and me.[16]) Briefly, the case is that of a primipara, 21 years of age, who had gone over her expected date a week. She was given 5 grains of quinine. The membranes ruptured spontaneously and after a long dry labor a breech extraction was done under ether anesthesia. There was a second degree laceration which was repaired while waiting for the separation of the afterbirth. The placenta was then expressed by gentle Credé. The placenta and the inverted uterus appeared at the vulva. The placenta was removed. It was not attached to the inverted uterus. The inversion was easily corrected manually. There was moderate bleeding with slight shock. The patient has since gone through a normal confinement under the care of Dr. Mason.

Case 2.—(Previously reported in the *New England Journal of Medicine*[20]) The patient was a thin, delicate, para II, 22 years of age. She was delivered by version and extraction under ether anesthesia. The duration of labor was seven hours. The position of the placenta was noted to be on the anterior wall near the fundus of the uterus. While we were waiting for the placenta to separate, the contour of the uterus was plainly visible through the thin abdominal wall. There was a depression just where the placenta was attached. The de-

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pression was so deep that the question of the presence of a bicornate uterus was discussed. Traction on the cord caused a deepening of this depression. We were talking to the patient, who had waked up from her anesthetic, and experimenting with the depression when the placenta appeared at the vulva. At the same time the uterus disappeared from beneath the intern's hand. The placenta was still attached to the inverted fundus of the uterus. It was easily peeled off and the uterus reinverted. The patient continued to talk as if nothing had happened. She was put back to bed with a blood pressure of 112/70, a pulse of 80 and a temperature of 98.8°. The puerperium was normal. She has since had two children and an induced abortion.

Case 3.—Mrs. C. N. B., aged 27 years, consulted me March 18, 1931, ten days after she had first felt fetal movements. Her last menses began October 15. General physical examination was negative. The blood Wassermann was negative and the pelvis was normal. The pregnancy was normal except for the occasional finding of a faint trace of albumen in the urine. She entered the hospital in labor on July 21. When the cervix was half dilated she was given 60 mg. of tribromethyl alcohol per kilo of body weight. The cervix was fully dilated in 12 hours and a version and extraction were done under light ether anesthesia. The patient took the anesthetic poorly and there was much choking and vomiting, but the operation was easy. The placenta was found in the top of the uterus. The patient began to bleed. Gentle traction on the cord showed that it was still attached. One-half c. c. of pituitary extract was given hypodermically. The uterus became firm and round and the placenta was expressed by moderate pressure. At the same time the uterus disappeared from the abdomen and was found within the afterbirth, which was still attached. It was easily separated from the uterus and the uterus was reinverted without difficulty. The patient was put back to bed with a blood pressure of 130/90 and a pulse of 90. The mother and baby were discharged from the hospital on the sixth day. She has since had three children and a spontaneous abortion.

Case 4.—Mrs. M., a primipara, 41 years of age, consulted me on August 27, 1932. She weighed 155 pounds. Her general physical examination was negative. Pelvis was normal and the blood Wassermann was negative. Her last menses began on January 17. On several occasions she had a tiny trace of albumen in her urine. On October 22, two days before the expected date of her confinement, she went into the hospital for induction of labor. She was given an ounce of castor oil and five grains of quinine and the membranes were ruptured at 1:25 p. m. The position of the fetus was right occipito-posterior. The patient had nagging pains all night. At 8:52 a. m. October 23, there was only two fingers dilatation. A No. 5 Voorhees bag was placed and the patient was given 60 mg. of tribromethyl alcohol per kilo of body weight. When the bag was out of the cervix, it was removed without deflation. Examination with the whole hand, the patient being under ether anesthesia, showed a moderate constriction ring. This was relaxed with 5 minims of epinephrine and an easy version and extraction were done. Total duration of labor was 22 hours. There was no laceration of the perineum. One-half c. c. of pituitary extract was given and the placenta was delivered by gentle traction on the cord. It was found to contain the inverted uterus. The placenta and membranes were quickly stripped off and the uterus was reinverted. The restored cavity was explored and some membranes were found and removed. The patient was put back to bed with a blood pressure of 98/68. One and one-half hours after the baby was born the patient complained of severe abdominal pains, began to bleed and passed a large clot, to which some membranes were attached. The bleeding was controlled by compression of the aorta until a second dose of pituitary extract could be given, which stopped the bleeding. The patient was given a hypodermoclysis of 500 c. c. of saline, to which was added 1 c. c. of pituitary extract. The mother and baby were discharged from the hospital on November 2. Postpartum examination on December 7 disclosed a slight cervical tear posteriorly and an anteflexed movable uterus of moderate size.

Case 5.—Mrs. W. W. P., a primipara, 21 years of age, consulted me March 13, 1934. She was due by Naegele's rule on September 14, and by movements September 2. She was 5 feet, 1 and 7/8 inches tall and weighed 88¼ pounds. She had a normal pelvis and negative blood Wassermann. She gained 19 pounds during her pregnancy, which was entirely normal. On September 3, she went into the hospital for induction of labor. She was given an ounce of castor oil and 5 grains of quinine and the membranes were ruptured. The cervix was entirely effaced and one finger dilated. When the head was out of the cervix and in left occipito-posterior position, Kielland forceps were applied and an easy extraction was done. Total duration of labor was eight hours. A right lateral episiotomy was repaired with three longitudinal sutures of silkworm gut while waiting for the placenta to separate. An attempt was then made to deliver the placenta by cord traction, but the cord broke. It was delivered by Credé's method. When the placenta appeared at the vulva it stuck tightly. Harder pressure was made on the fundus and it disappeared. The placenta was felt to contain a hard mass and bimanual examination showed a definite cuplike depression in place of the fundus. The placenta was removed and the uterus replaced. The puerperium was normal. The mother and baby were discharged from the hospital on September 10. Postpartum examination on October 1 showed a round, smooth cervix and a small anteflexed movable uterus. The patient menstruated normally on November 1, 1934.

Case 6.—Mrs. J. E. P., a primipara, 22 years old, consulted me on December 27, 1935. Her last menses began on May 28 and she felt movements on October 15. Her pelvis was normal and the blood Wassermann was negative. Nothing abnormal was made out on physical examination, but she was nervous and gave a history of reacting contrarily to most drugs. On March 2, her blood pressure rose to 145/90 and there appeared a trace of albumen in the urine. She went into the hospital for induction of labor on March 4. An ounce of castor oil and 5 grains of quinine were given and the membranes were ruptured.

Progress was slow and it was nearly 24 hours before the cervix was fully dilated. When the head was finally out of the cervix and had rotated anteriorly, forceps were slipped on and the baby was easily delivered under ether anesthesia. The cord was allowed to pulsate for 25 minutes. A right lateral episiotomy was repaired with four layers of chromic catgut. The patient began to bleed and lost about 300 c. c. of blood. She was

given 1 c. c. of pituitary extract and the placenta was expressed. When she was put back to bed her condition was recorded as being good. Her blood pressure was 100/70. However, she continued to have a flow greater than usual in spite of elevation of the foot of the bed and the administration of ergot. In 12 hours her pulse had risen to 120. She was unable to void and had to be catheterized. On the third day her temperature rose to 101° and continued between 101° and 103° until the seventeenth day, when it slowly receded, reaching normal on the twenty-ninth day. The patient voided for the first time on the twenty-sixth day. She continued to have a very free red discharge all this time. A transfusion was tried, but she reacted badly, the temperature rising to 105° and the pulse to 160. The possibility of an inversion of the uterus was thought of and a vaginal examination was made with that in view. The cervix was found just back of the symphysis and a soft, boggy retroverted uterus was found in the hollow of the sacrum. The mother and the baby were discharged from the hospital on April 24, the fifty-first day of the puerperium. She recuperated slowly at home and had several episodes like menstruation except that the flow was very profuse. She was readmitted to the hospital on June 21 with a hemoglobin of 15 per cent and a red cell count of 1,000,000. Vaginal examination showed a partially inverted uterus, the fundus protruding through the cervix for a distance of about one-half inch. A series of transfusions was begun. On June 25, after the third transfusion, the hemoglobin was 40 per cent. I attempted to reinvert the uterus, but failed. After epinephrine had been given I was able to push the fundus up to the external os, but could not make it reinvert. On June 26, a No. 3 Voorhees bag was placed in the vagina and 3 pounds of mercury were poured into the bag. The foot of the bed was elevated in the hope that the continued weight of the mercury would cause a reinversion. The next day the bag was removed. The fundus was paler and a little smaller, but more of it protruded from the cervix. The bag was replaced, the mercury poured in and then the bag was tightly filled with a cresol solution and the foot of the bed elevated as before. The patient was instructed to lie on her abdomen. On June 29, the bag was removed. The fundus was found within the cervix. Under intravenous barbiturate anesthesia I was able to push it above the internal os, but it would not invaginate. A No. 5 bag was placed in the vagina. When this was removed on July 1, the uterus was turned practically entirely inside out. The next day the patient began to bleed and to pass clots. It was thought best not to temporize any longer. Accordingly the inverted organ was removed *per vaginam* by Dr. Johns, under ethylene anesthesia. When the specimen was split open there were delicate adhesions in the cornu. The uterine wall was thick and very firm. Even after the cavity had been split entirely open the uterus could not be turned right side out. The patient made a satisfactory recovery and was discharged on July 19.

Case 7.—Mrs. J. L. L., a 23-year-old primipara, was seen in consultation three-quarters of an hour before she died. As she had gone past her due date, she took 20 grains of quinine on her own initiative. She came into the hospital in active labor at 9:40 p. m. She was given 9 grains of sodium isoamylethyl barbiturate. The membranes were ruptured at 10:50 p. m. At 11:00 p. m. she was given 1/200 gr. of hyoscin, at 11:10 p. m. 3 more grains of the barbiturate and at 11:30 p. m. 1/200 gr. of hyoscin. She was delivered with low forceps at 12:30 a. m. under ether anesthesia. The placenta was delivered at 12:45 a. m. by Credé. Total duration of labor was four hours. There was moderate bleeding and the mother was given one dram of ergot and 2 c. c. of pituitary extract while still on the delivery table. After the patient was put to bed she went into profound shock. The foot of the bed was elevated and the patient was given 1,000 c. c. of glucose in saline solution in the vein. When I saw the patient she was being given oxygen inhalations. Her respirations were shallow and rapid. No pulse could be felt at the wrist, but the heart could be heard to be beating. The nails were blue and forearms cold. There was a little trickle of bright blood from the vagina. The abdomen was not distended. A hard rounded mass that reached nearly to the navel was felt. She was given one-half c. c. of epinephrine into the heart, but there was no appreciable response. The patient soon ceased to breathe and could not be resuscitated with a pulmotor. The supposition was that the patient had an idiosyncrasy to the barbiturate and that her shock was really a barbital poisoning. To support this there was the history, though vague, that the patient reacted badly to aspirin. Autopsy by Dr. Kimmelstiel was entirely negative except for the pelvic organs.

"The fundus and body of the uterus stand approximately 10 cm. above the symphysis. The fundus is invaginated, the tubes and ovaries being drawn into a deep fold formed by the invaginated uterus. The invaginated portion fills out the entire cavity and the fundus is at the level of the internal os. The inner surface of the uterine cavity after reposition of the invagination shows the normal appearance after delivery except for a few small remaining portions of the placenta still adhering to the inner surface. The wall is not particularly soft and is intact."

Case 8.—Dr. Whitfield has kindly given me permission to include two cases of his in this series. The first has been reported by him in the *Virginia Medical Monthly*.[22] She was a 22-year-old primipara who entered the Sheltering Arms Hospital in labor at term February 12, 1931. The next morning, as she had made no appreciable progress, a No. 5 Voorhees bag was placed. The bag was expelled in about 30 minutes and a normal living male child was delivered by version and extraction. Moderate difficulty was encountered and two doses of 7½ minims of epinephrine were given hypodermically because the uterus was tightly contracted. Two doses of 0.5 c. c. of pituitary extract were given to aid in the expulsion of the placenta and the uterus was gently massaged. After about 30 minutes, the uterus was felt to contract firmly. It slipped from his grasp and appeared outside the vagina. The placenta was removed and the uterus immediately replaced under ether anesthesia. The uterine cavity was packed. The pack was removed in 12 hours. The mother and baby were discharged from the hospital on the twelfth day. She has since had an uncomplicated delivery.

Case 9.—On June 26, 1933, a 19-year-old primipara was seen at the Sheltering Arms Hospital for pyelitis and pregnancy. After a week's observation and treatment she was discharged. On August 8, 1933, she returned to the hospital in labor. She was neurotic and uncooperative. The pains were very irregular. When the cervix finally disappeared 12 hours after the be-

ginning of labor a low mid-forceps application was done and a living male child was easily delivered. A moderate size second degree laceration was repaired. It was then noted that the placenta was visible at the vulva. There had been no bleeding and no pituitary extract had been used, nor had the uterus been massaged. When the physician attempted to lift the placenta out of the vulva he realized that within the afterbirth was the inverted uterus. The uterus was reinverted and the placenta was then removed manually. One c. c. of pituitary extract was given and the patient was returned to her room in good condition. The puerperium was normal and the mother and baby were discharged from the hospital on the seventh day.

DISCUSSION

The rarity of this accident probably has been overestimated. DeLee,[7] in discussing Palmer Findley's paper before the American Gynecological Society, said that one case had occurred in something over 65,000 labors in the Chicago Lying-In Hospital. Yet he reports two cases in which the uterus began to turn inside out as he was watching the third stage. He reinverted the fundus of the uterus very quickly and packed. He also reports a patient who died in her home before she could be brought to his hospital. Polak[18] reported six personal cases that had not been reported. Barton Cooke Hirst[12] reported six cases and Adair two cases.

The mechanism of the production of the inversion offers an opportunity for interesting speculation. One group thinks that inversion can occur only in an atonic uterus. If the walls are flaccid, the womb is pulled or pushed inside out very much as one would a sock. Another group believes that it is produced by an overactivity of the uterine muscle. DeLee[8] pictures an intermediate mechanism with a relaxed lower uterine segment and a tonically contracted fundus. This is exactly the condition that pertains after delivery under spinal or caudal anesthesia. The first time that I examined such a patient I was startled, to put it mildly. It seemed that the little ball-like fundus would surely drop through the widely expanded and flaccid lower uterine segment. That it does not do so is proof that this is not the correct mechanism or that there is an added factor. My impression from the study of my own cases and those reported in the literature is that the uterus is overactive at the time of the inversion. In Charbonnet's[4] case the placenta was catapulted with such force by the inverting uterus that it struck the abdomen of the accoucheur who was standing two feet away. Sometimes this is a natural condition and sometimes it has been brought about by the administration of strong oxytocics. I am inclined to think that the site of the attachment of the placenta does not share in the contraction of the fundus as a whole. In the first place, the inversion is often preceded by a more than ordinary bleeding, to control which the attendant resorts to vigorous methods, mechanical or otherwise. In the second place, the primary depression has been shown in some cases to occur at the seat of attachment of the placenta. Atthill[1] believes that inversion occurs only when the placenta or a sessile tumor is attached to the fundus of the uterus. There are instances, however, where an inversion has occurred in a case of placenta previa (King). Gordon[11] has studied histologically an inverted uterus with a fundal attachment of the placenta that was removed at operation. Sections from various parts of the uterine wall other than the placental site showed normal muscle. A section from the placental site showed definite destructive action on the myometrium. The weight of the placenta might easily cause a depression of such a myometrium and the overactive uterine muscle of the remainder of the uterine wall would seize on it and expel it as it would a foreign body.

The etiology is usually dismissed with the statement that it is due to mismanagement of the third stage. It is easier to make such a statement than it is to define either mismanagement or good management of the third stage. I believe the best management consists of lifting the uterus into the abdomen where it is simply held, not massaged, according to the methods first described, I believe, by Dickinson. It is the only method not used in the cases reported. Sometimes it is necessary to press the uterus backward towards the backbone, as well as cephalad, in order to straighten out an anteflexed organ and allow the placenta to escape. Traction on the cord then can do no harm. After the placenta has been delivered, the patient is to be given one of the water soluble preparations of ergot.

I agree with Brett[3] that sepsis is a comparatively unimportant factor. However, in a series of 63 cases that Dr. Mason and I collected in 1925 that had been reported since Evans'[10] paper, there was one death from sepsis. In only two of my cases was there any shock when the inversion occurred. In the seven cases without shock manual reinversion was easy. In two instances this was followed by mild shock and in five it caused the patient no apparent inconvenience. It would seem best, therefore, when

there is no shock, to reduce the inversion immediately. If shock be present, it should be treated by transfusion and other means. The inverted organ should be replaced within the vagina and the vagina should be packed with gauze. Miles Phillips[17] has shown that to attempt to treat the inversion in the presence of shock results in a mortality of 30 per cent, whereas if the shock be treated first the mortality is 5 per cent. However, should bleeding continue so that the treatment of shock is likely to be ineffectual, I believe the reduction of the inversion through the abdominal incision as described by Huntington,[13] Kellogg,[14] Irving and others is the procedure to be followed. They report a dramatic relief of the shock as soon as the inversion is corrected.

After the patient has recovered from the shock, the inversion can be dealt with by the most appropriate means. In some instances, reinversion takes place spontaneously. In some, manual replacement is readily accomplished. Where the constricting cervix offers an obstacle to the replacement, the intramuscular injection of epinephrine helps, as in a case reported by Urner.[21] Quigley[19] recently reported the successful use of a homemade Aveling repositor. Some cases will have to be dealt with surgically and the abdominal route seems to be growing in favor.

CONCLUSIONS

(1) Puerperal inversion is a commoner condition than is generally thought.

(2) There is need for further study of the physiology and the pathology of the third stage of labor.

(3) A prompt recognition of the condition simplifies the treatment and greatly enhances the chances for the patient.

(4) It should be thought of as a possibility in all cases of shock and hemorrhage occurring shortly after labor.

(5) When an inversion has begun, strong oxytocics probably hasten its completion.

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DISCUSSION (*Abstract*)

Dr. W. T. Pride, Memphis, Tenn.—It has been my misfortune to see a few cases of puerperal inversion of the uterus and not until the anatomical arrangement of the musculature of the uterus was understood could we find an explanation for it. Now we know that contraction rings are normal in a uterus expelling a fetus or placenta. When this ring persists, leaving a relaxed uterus above and below, if the placenta happens to be attached to the upper relaxed portion when it is expelled, it may bring this relaxed portion through the ring, turning the uterus inside out.

Dr. George T. Allen, Oklahoma City, Okla.—In Oklahoma City, in our two largest hospitals, there have been fewer inverted uteri than Dr. Rucker has reported in his paper. At St. Anthony Hospital there have been three cases of inverted uteri in more than 15,000 deliveries. Of these three, only one was delivered by a regular obstetrician. We have several good obstetricians here, and of the several only two have had inverted uteri in their private practice. Each has had only one case.

The first case was a primipara, aged 23 years. After spontaneous delivery, the placenta delivered by Credé, the uterus inverted but was immediately replaced. The patient suffered only mild shock and recovered quite readily. No reason for inversion was given.

The next case, gravida II, aged 27, had a spontaneous delivery. There was a note on the anesthetist's chart concerning the third stage as follows: "Placenta was very stubborn in turning loose, delivered by Credé and traction on cord with difficulty. The uterus inverted and was replaced immediately. The vagina was packed with one large vaginal pack." Incidentally the patient suffered only mild shock and recovered completely.

The third case was gravida I. She had a spontaneous delivery, but a prolonged labor. There was no record on the regular chart of the third stage. The anesthetist's note was as follows: "Upon attempt at delivery of the placenta by traction on the cord, the cord broke and the patient began to bleed. The placenta was delivered by pressure on the fundus. The uterus inverted and was replaced immediately. The patient suffered a violent vomiting and coughing spell. The uterus again inverted and no further attempt was made at replacement. The vagina was packed." The patient died in less than two hours.

Certainly it is reasonable to believe from notes on these charts that two out of three of these inverted uteri were due to faulty management of the third stage. The cause for the other is doubtful.

In 5,400 private cases in our clinic since 1924 we have had no inverted uteri.

In 5,000 hospital deliveries at University Hospital

(mostly charity patients) and almost twice that number of home deliveries, we have had no inverted uteri. In other words, there have been only three such cases in more than 35,000 deliveries in the two largest hospitals.

At the University we teach our students that the placenta should not be delivered until there are signs of separation, there should be no traction on the cord, and if the Credé method is used, pressure should be exerted only when the uterus is contracting.

Since I am interested in anesthesia during delivery, I thought it worth-while to note that Dr. Rucker used ether exclusively. It is possible that the ether anesthetic plus the shock of the prolonged labor or actual delivery of the cases reported (which incidentally were all what I consider difficult deliveries) resulted in a temporary atony of the uterine musculature. Since most textbooks agree that this condition may predispose to an inversion, this fact may explain the difference in incidence of such cases in his practice and our own private practice, as we use nitrous oxide anesthesia exclusively and deliver the placenta only during a contraction. We probably use more than our share of Credé, yet have had no such experiences as Dr. Rucker has brought out in his paper.

Dr. Jos. W. Reddoch, New Orleans, La.—I have a slide showing a specimen of inversion of the uterus removed at autopsy from a case occurring on the Tulane service at Charity Hospital. The case is a recent one, having been admitted to the ward last week after delivery with the uterus turned wrong side out. She died, was in shock on admission and died before any attempt could be made to replace the uterus. I do not know any of the details of the case. Pictures were handed to me the day before I left for Oklahoma City. I felt that this case would serve to impress all of us with the fact that inversion of the uterus is not something that happened years ago and is only something to write and talk about. On the other hand, it may be met with by any of us where too vigorous an effort is made to terminate the third stage of labor.

Dr. E. Lee Dorset, St. Louis, Mo.—There are two types of uterine inversion, the extravaginal and the intravaginal. The intravaginal is again divided into two types, the complete and incomplete.

The exact cause of this rather rare condition is not exactly known, but it is surmised that the contributing factors are the thinning of the uterine wall at the placental site, the irregular contractions of certain groups of uterine muscles against another group, the relaxing of the lower uterine segment, and added to all of these, the mismanagement of the third stage of labor, i. e., too severe pressure upon the fundus of the uterus in an effort to expel the placenta when the uterus is not properly contracted and pulling on the cord at the same time that the uterus is squeezed.

In all of the cases of inversion of the uterus that I have seen, five in number, the patients have been primiparas. The first case was one that had been delivered in the home; and there was an extravaginal inversion that had been present for five weeks. A vaginal hysterectomy was performed and the patient made an uneventful recovery. The second case happened in my own practice. The uterus was inverted extravaginally without any evidence of hemorrhage or shock and was easily replaced by pushing it back with the hand in the form of a cone. This case later became pregnant and was delivered of a second child without any complications. The third case was sent to the hospital with a complete extravaginal inversion and was in a severe state of shock and pulseless from hemorrhage. She expired before even a transfusion could be given.

The fourth case was one seen in consultation at a time when I happened to be in the hospital in which this accident happened. It was an extravaginal inversion and was easily replaced by the method used in the third case.

The last case was one in which there was considerable hemorrhage and shock. There was no evidence of prolapse until it was discovered at a vaginal examination when an attempt was made to pack the uterus. A hard, ball-like mass was found filling the vagina which proved to be the uterus. An attempt was made to replace the inverted uterus and it was thought to have been successful. The uterus was partially packed. When the fundus of the uterus was palpated, a cup-like depression was noted in the fundus, from which finding it was deducted that we had converted a complete intravaginal inversion into a partial inversion. The patient was immediately taken to the operating room, given 750 c. c. of citrated blood, the abdomen opened under local anesthesia, the uterus grasped by two Allis forceps at the point of the insertions of the two round ligaments and the depression was pulled out into its normal position. The abdomen was quickly closed; and the patient made an uneventful recovery. I delivered this woman of her second baby two months ago without any complication in any of the stages of labor.

Dr. Rucker (closing).—There is much about the physiology and management of the third stage of labor that needs further study. Inversion of the uterus is not, however, such a rare condition that it should not always be kept in mind when a patient is shocked or bleeds immediately after delivery.

A REVIEW OF SOME OF THE HISTOGENETIC RELATIONSHIPS OF THE SKIN*

By M. TOULMIN GAINES, M.D.
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Mindful of the futility of presenting clinical considerations unaccompanied by data and statistics approximating astronomical figures rarely accorded an office practitioner, I have decided that my prerogative as chairman would be utilized best by giving a general and somewhat superficial survey of some of the fundamentals of our subject.

In attempting this I shall have recourse, for the most part, to the dicta of authorities; but shall occasionally interpolate an individual interpretation, trusting that its validity will not be appraised too critically.

My object is, by a rapid resumé from the

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correlation viewpoint, to disperse the odium that clings to our recollection of enforced classroom study of dry and apparently unrelated facts; and to stimulate a renewed interest in the marvelously intricate investigations of those tireless workers who are enabling us to widen our scope and increase our understanding of the importance of the skin, and of the many factors involved in its deviations from the normal.

I shall attempt no practical applications, but shall append a list of some of the subjects involved, and problems implied, in these histogenetic relationships.

In the euglena, that unicellular organism which barely escapes inclusion in the vegetable kingdom, we find a pigment spot which is assumed to be sensitive to light.

In other more highly organized protozoans, differentiation of strands of protoplasm to form a neuro-motor system have been demonstrated, showing special paths of sensation within the cell itself.[1]

"In the sea anemones and jelly fishes the nervous system is for the most part a thickened portion of the outer skin and thus is in reality a part of the outer covering of the animal."[2]

In the lower forms, the cells of the ectoderm develop prolongations which convey impulses directly to contractile tissue. Such a mechanism is called a recepto-effector system.[3] More highly developed forms have spots of pigment, symmetrically situated, which are responsive to light and are connected with other ectodermal cells which by their prolongations send sensory impulses to deeper cells which convey motor impulses.[4]

The earthworm, without any organs of special sense, responds to light, sound, smell and orientation: all of which are accomplished by the sensitivity and conductivity of modified epithelial cells of the skin. The amphioxus, the precursor if not the progenitor of the vertebrates, gropes through life guided mainly by the first of the distance sense organs to appear in the ascending scale of life, namely, that of smell.[5] The so-called distance receptors for this sense are modified surface epithelium and this primitive arrangement persists in man, where the olfactory epithelium is prolonged into fibers which carry the sensation to the central nervous system.[6] Though this stimulation is carried to the central nervous system by surface epithelium, these cells are rather arbitrarily classed as distance receptors because the sensation is interpreted as coming from a distance, though the sense is at times indistinguishably associated with the effect of the surface receptors of taste.

The sense of sight, having its beginnings in the surface receptors of the jelly-fish as pigment spots, and traced in its development through the rudiments in the amphioxus, the eye in the lamprey, to its full development in higher forms where it becomes a distant receptor, is still dependent upon the cornea and lens, ectodermal structures, to receive the light; while in the embryo of several forms of animal life the ectodermal plate which is destined to form the retina can be found on the surface before it is infolded to form the optic vesicles of the brain.[7] A contributor to our *Archives* quotes an oculist's report on a case of photophobia "due to a retinal sensitization to light, it (the retina) being an ectodermal structure as is the skin;" while another consultant said that the condition of this patient's retina varied with the skin exacerbations.[8]

Recalling the otoliths of the jellyfish and the rudimentary ears of lower vertebrates, it seems to be of philogenetic significance that the vestibular portion or organ of equilibrium is completed in the human embryo; while the cochlea portion or organ of hearing reaches perfection some time after birth. Both the circular canals of the vestibule and the spiral organ of the cochlea are lined with ectodermal epithelium. The nerve fibers carrying sensations from the organ of equilbrium are grouped with similar fibers from the muscles, bones and tendons as proprioceptors. Those fibers which conduct the impulses from the eye, from the organ of hearing, and from the general surface of the skin, are known as exteroreceptors, which, including both distant and surface receptors implies a histogenetic relationship of sight, hearing, and touch. Exteroreceptors have been defined by a well-known authority as receptors that have arisen in relation to the integument.[9] The lower layers of the epithelium of the skin contain many cells modified to form surface receptors, which subserve tactile sensibility. In a recent dermatologic contribution, the author says that he has come to view the epidermic cells as not only protective covers, but as actual end-organs.[10]

The nervous system, we will recall, begins as a thickening of the ectodermal cells forming the neural plate, which becomes centrally depressed and forms the neural groove, the edges of which curve and connect to form neural tube. This,

at first continuous with the ectodermal layer, then becomes separated from it and forms the spinal cord and the brain. Professor George Parker, of Yale, says,

"Thus in the early embryonal growth of vertebrates the nervous system is temporarily a part of the outer skin, a condition that is permanent in sea anemones, coral animals and others of the same general type."[11]

On either side of the neural tube, groups of cells develop from the ectoderm, forming the neural crests which extend the whole length of the tube and form the ganglia of the posterior spinal roots. Cells from these ganglia put out prolongations which, extending to the epithelial layer of the skin, break up into minute plexuses and fibrillae which enter into the cell bodies, converting them into the end-organs just mentioned or end in crescent shaped plates between the epithelial cells. These are known as tactile discs and with the many varied other complex specialized nerve endings, such as end bulbs, Meissners corpuscles, Paccinian bodies, and others, are responsible for the sensations of touch, pain, temperature and possibly cold and heat; though temperature sense is now thought to reside in the receptors of the capillary loops.[12]

The cranial portion of the neural tube develops with a complexity commensurate with the development of the eye and ear, culminating in the human brain with twelve pairs of cranial nerves, which include the olfactory, the optic, the auditory; and afferent fibers from the others which correspond to spinal ganglion sensory nerves. At the same time there has been an ever increasing growth and complexity of the so-called autonomic nervous system, which is an outgrowth of cells from the spinal ganglia and spinal cord; in the thoracic and lumbar region where it is known as the sympathetic system; and from cranial nerve tracts where they bear the same histogenetic relation to the brain tracts and ganglia of the sensory cranial nerves, and are known as the cranial part of the parasympathetic system.

The parasympathetic is not involved in the innervation of the skin, but from the thoracic and lumbar segments efferent fibers are distributed to the sweat glands, the erector pilae muscles and to the peripheral circulation, where they activate the sweat glands independently of the circulation and cause contraction of the arterioles of the skin. These masses of cells which split off from the spinal ganglia and arrange themselves metamerically along the vertebral bodies on either side of the aorta, give rise also to another set of cells known as chromaffin cells, which are found in the sympathetic glands in front of the aorta, in the carotid body, and as the medulla of the adrenal gland. Stimulation of this by sympathetic impulses results in a general stimulation of the sympathetic and endocrine systems, which results in certain definite effects upon the skin. The product of the medulla, adrenalin, though a powerful stimulant for other organs with sympathetic innervation, does not bring about secretory activity of the sweat glands.[13] It seems to me to be of philogenetic significance that the skin of the head and face are supplied by branches from the thoracic ganglia. Also that the migration of sympathetic cells from the cord and spinal ganglia precedes the migration of homologous sympathetic cells from the brain stem and cranial ganglia; again reminding us that the brain developed with the elaboration of the special senses from the ectoderm.

So we have modification of surface cells to receive sensation; infolding of some of these surface cells for protection and central distribution; modification of some of these cells into conductors of sensation by prolongations which extend to the surface and receive impulses from the modified surface cells.

We have also another division and development of these infolded ectoderm cells to form a system of cells and fibers sending out impulses of stimulation and regulation of the glandular activity and blood supply of the surface of the body. These two nervous systems are so interrelated that an impression received over a small area of surface can be carried centrally by the spinal nerves and cause an immediate and widespread response through the sympathetic and the adrenal medulla to all parts of the body.

Now what of the other surface, the internal surface of the body? A modern medical authority describes our bodies as a closed universe limited on one side by the skin and on the other by the mucosa.[14]

Beginning with such simple organisms as the hydra and the polyps and jellyfish, we find that their essential progress from lower forms consists in an invagination of the outer layer of cells to form an inner layer which absorbs nutriment from the substances entering the cavity thus formed. That there is little differentiation in these surfaces, in lower forms, is shown by the fact that if the hydra be turned inside out the ectoderm will then function as the entoderm. Up the scale of life to the amphioxus, this gas-

trulation is easily observed in embryo. It is still demonstrable in fishes, amphibians, reptiles, and with some modification in birds, due to the size of the yolk. In mammals it is so modified as to suggest the hypothesis that it still adheres to methods formerly necessitated by the presence of a yolk.[15]

The opening where the ectodermal epithelium becomes entodermal epithelium in lower forms is known as the blastopore, and what is assumed to be the blastopore in the human embryo has the significant name of "neurenteric canal." So whether it is the homologue of the primitive blastopore or whether it is a grouping of what is known as organizator cells, it is at this spot that we find ectodermal cells converted into neural cells and also into entodermal cells.[16]

The word entoderm signifies the skin within and we find it to be an enormous extension of surface, not only because of the length of the gastro-intestinal tube, but because of the surface projections of its rugae, villi, and folds, and because of its glands. These tubes, ducts and expansions of their terminations effect actual contact with the vascular system on one side, and present a free surface, on the other, of incalculable extent.

The mucous glands and the digestive glands of the stomach and intestines, with the pancreas and the liver, are all epithelial downward growths of the surface; developing from the cells of the duct into the differentiation necessary to carry out its special function. The liver is only an apparent exception, as the bile capillaries are merely minute lumina of ducts whose walls are the larger liver cells. As these lumina lead into canaliculi in the cells themselves and as the cells are believed to be in some situations in actual contact with the blood stream there is in such areas an even more intimate relationship between the blood stream and the cell than in the lungs where the capillary wall is always interposed.

The lungs develop from an epithelial bud of the entoderm and develop similarly to a gland of the alveolar type. In contrast to the liver, where the terminal channels become smaller as the secreting cells become larger, in the lung the terminations expand as the cells composing them become wider and thinner. While it takes less imagination to consider the lung an extension of epithelial structure than in the case of the glands, yet the modern figures of the extent of lung surface as five hundred square meters is almost inconceivable.[17]

The first gland in the alimentary system to develop is the parotid, which precedes the formation of the sebaceous and sweat glands by several months and is of ectodermal origin as is the opening into the enteron of the higher animals.[18]

In some of the nerve degenerations of central origin we have a modification of the activity both of the parotid and of the sebaceous glands of the skin.[19]

The sebaceous glands develop from the fourth fetal month along with the hairs and later in some regions without accompanying hairs, and continue their development through early life and to some extent through adult life.[20] They are not considered true glands by some, their product being not so much a secretion as it is an exfoliation. Some authorities take the converse view of including the exfoliation of the skin as a glandular activity. The keratin of the general surface forms a dry impervious layer, but in the sebaceous glands it is combined with fatty substances to produce horn oil which absorbs water as lanolin does and mingles with the sweat to protect and lubricate the surface.[21]

The association of the sebaceous glands with the hairs whose erector muscles are supplied by the sympathetic nerves enables the muscular action on the hairs (in cutis anserina) to aid in extruding the content of the glands, hindering evaporation and conserving warmth.[21] The surface exfoliation mingles with the glandular element in some situations such as the formation of the smegma preputii. This is also true as to the vernix caseosa of which there is a very ingenious theory that the hormones which cause changes in the skin of the mother, especially in the mammary gland, causes hyperactivity of the skin and glands of the fetus.[22] The excess of sebaceous activity subsides by the fifth year with a recrudescence at puberty and another just preceding the atrophy of senescence.[23]

When we consider next the sweat glands, we find two facts rather at variance with above statements. First, that while most of the sweat glands are simple tubules coiled on themselves, to give length and conserve space, and secreting a watery product, the apocrine or sexual gland also contribute part of their cellular contents, so these would have to be excluded as glands along with the sebaceous follicles. Second, the

mammary gland is not, as would be expected from the fat content of its secretion, a development of the sebaceous glands, but it is known from its histo- and philogenetic relationships to be derived from the sweat glands.[24] In feline and canine animals, the sweat glands are found only in the foot pads, while in hoofed animals the extremities having an impervious covering, the sweat glands are found over the general surface. The panting of the dog when overheated is a familiar illustration of the effect of the absence of sweat glands and of their importance in aiding respiration and in effecting heat loss. While the lungs are ordinarily regulated from the central nervous system, yet under the influence of noxiae the respiration is controlled also by the carotid body which is a part of the chromaffin system previously mentioned, and the fibers of which are representative of embryonal structures[25] that, in lower forms supplied the gills, the latter being in fishes composed of both entoderm and ectoderm.[26] In the human, the sweat glands are especially numerous in the palms and soles, which are supposed to be free from sebaceous glands. This is interpreted by some[27] as an aid to grasping objects, but its association with mental stress is more likely to be the persistence of a primitive condition. It belongs to what might be called the fright, fight, or flight, complex.

The endocrine glands, except the adrenals and the posterior pituitary, are derivatives of the entodermal epithelium which, in earlier forms discharged their secretion into the enteric canal, but with the disappearance of their ducts now deliver their product directly into the blood stream. It may be that in simpler conditions the alimentary route sufficed; but the direct route into the blood eliminated any modification by the digestive fluids. Their diverse functions and reciprocal reactions cannot be taken up now, but we can note that the endocrine glands of entodermal origin are under hormonal control; and hormonal control is predominant in the pancreas, intestinal glands and liver, but the salivary, the lachrymal and the sweat glands are under nervous control.[28]

One author said,

"The endocrine glands that most markedly affect the skin are those developed from the same embryologic layer."[29]

The adrenal medulla and the posterior pituitary intensify or prolong the effect of the sympathetic control of the vessels of the skin and of the alimentary canal.[30] The sympathetic nerves cause vasoconstriction of the blood vessels of the mucous membranes of the head, of the gastro-intestinal tract and of the skin. It has been demonstrated that stimulation of visceral organs may produce vasoconstriction and increased sensitiveness with cutis anserina and sweating of the skin. This is interpreted as due to a single sympathetic neuron's sending processes to both the viscera and the skin as can occur when the spinal connections are destroyed. The ease with which this and the reverse reaction from skin to viscera can be demonstrated in lower vertebrates shows it to be a persistent primitive reflex.[31]

That the ischemia in the skin reflexes is sometimes accompanied by pain brings up the theory of pain's accompanying constriction of smooth muscle under certain conditions. Intestinal pain is believed to be caused by this mechanism. This reminds us that the efferent spinal fibers of the viscera do not convey sensations up to the level of consciousness[32] as do those of the skin, which accounts for the statement that "the skin is the organ of which the mind is most conscious."[33]

The author of this statement prefaces it by saying that

"Pathological cutaneous phenomena are conditioned by the psychical state in their development course and cure. One would expect this psychical influence on the skin to be as great as, if not greater, than upon any other organ of the body."[33]

Another has recently said,

"From the psychological standpoint the skin is first of all an organ of emotional expression; it reacts in its component parts like other viscera to feelings of anger and shame.[34] The many clinical relationships between the digestive system and the skin have been recently summarized characterising these conditions as a cuti-digestive vicious circle.[35] Another confrere has said there seems to be no reasonable doubt that an emotional, and even a nervous constitutional state, may markedly influence the skin through nutritional, vasomotor and reflex mechanisms."[36]

That a close clinical relationship between the skin and the gastro-intestinal system has long been recognized; while the pathologic and psychologic influence of the nervous system on both is being accorded more serious consideration and wider recognition.[37]

The plausibility of the histogenetic concept is strengthened by the distribution of those sympathetic fibers which control the caliber of the arterioles in both surfaces.

In the skin, the presence of elaborately differentiated cells and diversified receptors sending impulses to the central nervous system gives

opportunity for conflicts as well as correlations in the reactions of the capillaries. Central impulses communicated to the sympathetic and causing contraction of arterioles of the skin may be combined with local factors which may cause capillary contraction or dilatation, increased permeability, slowing, or diverting, of the circulation,[38] deficient oxygenation,[39] and so on. These factors may be the primitive receptor-effector impulse; the axon reflex; the much mooted, but still quoted antidromic action;[40] or primitive nerve plexuses similar to the submucous plexuses of the intestine[41] and the fibrillar network about the hairs, which can both be demonstrated to be independent of central connections.[42]

Recently a British author is reported to have discovered a set of local nerve plexuses in the skin that are independent of both the spinal sensory nerves and the sympathetic system. His name for this system implies a primitive nervous mechanism of defense; the word "noxifensor" evidently implying defense against noxiae agents.[43]

Such a complex innervation results in a varied response to different kinds and degrees of stimulation such as the white line, the triple response of the red line, the flare, and the wheal, and is concerned in the so far insoluble problem of the mechanism of itching.

To these effects must be added one final factor that has been implied throughout this paper, to wit, the primitive ability of the cell to modify itself to meet conditions, and the persistence of the primitive relationships in the human body. This involves the defensive activities of the cells of the skin in the production of histamine, and in the reactions of the tissues in allergic phenomena and in infection or immunity. It has been well said that as each cell carries on the functions of digestion, and of respiration, and of reproducing itself, so the individual cell carries some of the ability to protect itself.[44]

As to the skin as a whole, I cannot forbear to quote from two of our contemporaries,

> "* * * Medicine will learn to regard the skin as a highly differential parenchymatous organ of special significance in immunologic as well as in physical and chemical protection."[45]

A quarter of a century ago an anatomist suggested that the physician who realizes that the skin is a part of a coordinated organism, responsive to the disturbances of its other elements, will approach the problem of therapeutics with a better prospect of results.[46]

Let me close with the hope that this summary of the histogenetic and philogenetic relationships between the skin, the nervous system and the alimentary tract will awaken a renewed interest in the researches of the psychologist, the physiologist and the pathologist, and the application of their findings to our clinical problems.

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THE PRESENT STATUS OF SHOCK AND FEVER THERAPY IN OPHTHALMOLOGY*

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Shock and fever therapy is now well established as a treatment for diseases of the eye. The multiplicity of reagents which may be used to produce fever or shock often leaves the ophthalmologist at a loss when he attempts to select the most satisfactory material.

In the past twenty years an enormous number of substances have been tried as fever producing agents. Peterson[1] lists the following: counter irritants, such as the actual cautery, moxas, and blisters; blood and serum, both normal and immune, from man, animals, fowls and so on; diphtheria and tetanus antitoxins; proteins in the form of milk, egg albumin, and casein; plant proteins and protein split products; enzymes and tissue extracts; vaccines of all kinds; bacterial extracts and related products; colloidal metals such as gold, silver, manganese and mercury; yeasts; irradiation by radium, roentgen rays and actual sunlight, and such heterogeneous substances as hypertonic salt solutions, distilled water, formalin and turpentine. To these may be added a stabilized emulsion of Ducrey bacilli, sulphur in oil, a nonspecific protein mixture prepared with extracts of fever producing bacteria; tuberculin; the Kettering hypertherm, short wave therapy, and malaria therapy. Indeed recent reports of excellent results obtained in treating inflammatory diseases in other parts of the body by combining hyperpyrexia and chemotherapy have led to their use in ophthalmology. Culler and Simpson[2] combined bismuth arsphenamine sulfonate with the use of the Kettering in the treatment of syphilitic diseases of the eye. Ballenger and Elder[3] have combined sulfanilamide with the Kettering hypertherm in urethral gonococcal infections and conceivably this form of therapy might be of equal value in similar infections of the eye.

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It is not the purpose of this paper to present a new form of therapy, but to review the work of others and to attempt to evaluate properly the various forms of therapy insofar as they may be applied to ophthalmology. In considering the various therapeutic agents, one must remember that any one or all of at least four reactions may be involved.

(1) Shock
(2) Hyperpyrexia
(3) Allergic sensitizing effect
(4) Chemotherapeusis of actual destruction of bacteria by a drug.

When one studies the literature on parenteral administration of foreign protein, he is immediately impressed by the difference of opinion as to which element of the reaction is really productive of the results. Although foreign protein introduced into the body for the treatment of infectious processes has been in use since 1904, the hyperthermic element of the reaction was at first considered of minor importance. As late as 1925 we find the following statement:[4]

"It tends to give the erroneous impression that it is our opinion that the elevation of the temperature is the healing factor."

In the last few years the hyperthermic factor has received considerably more attention. The consensus certainly places the emphasis on the febrile reaction and there is ample evidence to substantiate the belief that the hyperthermia *per se* is of benefit, but there is equally good evidence that the benefit is derived from the leukocytosis and the increased titer of antibodies in the blood, even when there is no elevation of temperature. Investigators of unquestioned ability[5] present abundant evidence that nonspecific antibody formation is the essential reaction, and that the fever is merely the by-product of antibody formation. Key, in discussion of Allen, says:

"The good results observed following nonspecific protein injection may be an expression of cellular resistance observed in the stage of sensitization in anaphylaxis; in other words, the cells have been made more resistant to the infectious agents by the foreign protein."

The rapidity with which improvement is noted in iritis and nonspecific uveitis in which no causative organism can be demonstrated, and in which it is assumed that the exciting agent is the toxin of organisms growing elsewhere in the body, would certainly seem to indicate the importance of antibody formation.

On the contrary, the improvement noted in

hyperpyrexia produced mechanically by the Kettering hypertherm, short wave therapy or diathermy, can hardly be attributed entirely to antibody formation. Elevation of the temperature of the body is invariably beneficial, by whatever method it may be produced. Indeed, this method is nature's own, excessive warmth of the part being one of the cardinal signs by which we determine the presence of the healing process we know as inflammation. It is not surprising, then, that even such simple procedures as the superficial application of heat in the form of fomentations or infra-red rays are followed by hastening of the healing process. In like manner, similar results are expected and are produced by short wave therapy and local diathermy. K. Bergler,[6] discussing short wave therapy, reports his results in 170 cases extending over a period of two years. The best results were obtained in cases of iridocyclitis and in the acute stage of interstitial keratitis. No improvement was found on treating degenerative diseases of the cornea. Marginal ulcers were not helped, and the results in the treatment of deep herpetic diseases were not uniform. Retrobulbar neuritis was not benefited. Dupuy, in discussing Benedict's paper on the use of typhoid vaccine, says that as a rule the improvement is equal to the amount of constitutional reaction obtained; in other words, if followed by a chill, malaise, or if the patient is greatly disturbed, the improvement is more marked than when there is low temperature and very little clinical reaction.

Such statements are typical of the reports of the users of short wave therapy and other local heat producing agents, as well as of those who believe the hyperthermia to be an important factor when produced by foreign protein. Is it not probable that the improvement noted is the result of the combined action of leukocytosis, increase in antibody formation and hyperpyrexia?

Among the first to use foreign protein in ophthalmic disease was Darier,[7] who, in 1904, made use of antidiphtheritic serum in infections other than that of the Klebs-Loeffler bacillus. Later he made use of yeast serum, autoserum, milk and the proprietary products of milk protein. Later Szily and Sternberg[8] first made use of typhoid vaccine in ophthalmoblenorrhea, selecting the preparation because of its definite composition. Subsequently they used the vaccine in other conditions. They studied the effect of the drug in sixty eyes, reporting favorable results in corneal ulcers, both in those containing pneumococci and in those which did not show this organism. Cases of iritis, both syphilitic and non-syphilitic, were improved. These early investigators were among the few to report favorable results in neuroretinitis.

Appraisal of all suggested agents leads to the conclusion that none has produced results that would not have been obtained with one of two substances: sterile milk for intramuscular use and typhoid vaccine for intravenous use, sterile milk being most acceptable for non-hospitalized patients and typhoid vaccine being most satisfactory for those who may be hospitalized. A definite preference is noted for sterile milk in gonococcal infections, while typhoid vaccine is preferred in iritis, uveitis, corneal ulcers and endoopththalmitis. The dosage of intramuscular milk appears to be fairly well standardized at from 5 to 10 c. c. and the interval between treatments at from three to five days. There is not much unanimity of opinion regarding typhoid vaccine.

In the matter of dosage, of the number and frequency of treatments with typhoid vaccine, there is much difference of opinion. We find in literature recommended initial doses varying from 10 million to 100 million killed bacteria and succeeding doses ranging upward to as high as 2,500 million given as a tenth intravenous dose. Some authors believe that more than three treatments are of relatively little value and warn against the possibility of sensitizing the patient to the substance. Yet another author cites the case of a woman with uveitis who received sixty intravenous injections of vaccine in a period of about eighteen months. As to frequency of treatment there is more uniformity of opinion. All are agreed that a second treatment should never be given while the reaction of the first continues. It is emphasized that even after the immediate reaction, treatment during the so-called negative phase may lower the titer of antibodies instead of raising it. The recommended frequency varies from immediately after the temperature of the patient has returned to normal to as long as weekly intervals. In attempting to evaluate these variables, one is impressed by the fact that of the cases reported the best results are obtained where neither too great nor too little reaction is obtained. Whether the elevation of temperature is the most valuable component of the reaction or not, it is, for practical purposes, the most satisfactory index of the amount of reaction. A reaction of 102 to 103° F. appears to be optimal. Such a reaction is often produced by from 10 to 20 million killed bacteria administered intravenously. Few reactions were insuf-

ficient when 20 million killed bacteria were administered and no reaction was too great. That amount is therefore considered a satisfactory initial average dose. The most satisfactory results were obtained in cases in which the treatment was repeated in 24 to 36 hours after the cessation of the reaction as indicated by the return of the temperature to normal. While it is possible that most of the benefit to be obtained by this therapy occurs as a result of the first three doses, I can find no contraindication to a greater number of treatments where the disease is not arrested and the patient is withstanding the reaction satisfactorily.

CONCLUSIONS

(1) Shock or fever therapy, however produced, is a valuable form of treatment in ophthalmic disease.

(2) The procedure has produced gratifying results in nearly all forms of acute and chronic infectious and inflammatory manifestations of the eye and its adnexa.

(3) While the reaction may be produced by innumerable reagents, boiled milk and typhoid vaccines are probably most acceptable.

(4) From 5 to 10 c. c. of boiled milk for intramuscular use and vaccine containing from 10 to 20 million killed bacteria for intravenous use appear to be an ample initial dose for the average 150-pound adult.

(5) An increase of approximately 50 per cent over the first dose is necessary to produce a similar reaction from the second dose.

(6) Although the exact means by which improvement is obtained is not known, it is probable that both antibody formation and fever production are valuable factors.

(7) For the control of dosage, the amount of elevation of temperature is a satisfactory index of the amount of body reaction.

(8) Moderate reactions producing a temperature of approximately 102° F. produce maximal results.

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DISCUSSION (*Abstract*)

Dr. T. J. Dimitry, New Orleans, La.—Dr. Howell has presented a contribution of distinct merit. It is most interesting and timely. He would take us out of a land of intense darkness and seek explanation for the beneficial effect of certain agents that produce either shock, fever, leukocytosis, allergic sensitizing action or what not with a desire to advance the better of the agents, particularly those having a selective effect on eye disease. I sympathize with him, for his labor is great and I see little hope for a selection of a particular agent at the present time; the pharmacodynamics of these agents are greatly confused.

Many of us have wondered as he is now wondering whether the results the agents bring about are produced by the heat, the leukocytosis or the shock. Speculation has been rife for many years. In fact, there are hypotheses galore, today one explanation and tomorrow another. Dr. Howell writes as if such materials have been used only in the last twenty years, and furnishes rather a complete list of them, taking his information from Peterson. I would like to add to his list the greatest of materials, namely, the sun, the ultraviolet radiator, used as a therapeutic agent in 1360 B.C. Rashi tells us that the "sun hastened to come up for Jacob to heal his injured side with heat, and after several exposures he became fully cured." Another material was the Sinugaga plant told of by Seeman on his visit to the Fiji Islands. When it is burned in a small room, the heat it generates is claimed to cure leprosy. It was not ignorance on the part of the Melanesians that popularized a remedy so very strange any more than on the part of those who now use the heat of the Kittering hypertherm. Did the heat act *per se* or did it provoke a leukocytosis? The detail man would have you believe the heat is not necessary.

My first contribution on the subject of proteins was in 1917. However, I studied the problem years before and when I did write, I hedged and claimed that the results came from all three reactions, namely: shock, fever and leukocytosis. I was also sufficiently bold to comment upon the fact that results were better when fever followed on the use of those agents. However, with the fever the leukocytosis was greater. Trachoma, ophthalmia, ulcers of the cornea and so on were benefited sometimes in a most remarkable manner after the use of these agents. But I warned that tuberculous uveitis was made worse by injection of cow's milk. I followed upon the teachings of Brucke, the physiologist, who made the basic studies on the digestion of the proteins and their injection parenterally. I continued his work and interested myself in the protein fevers and the division of the proteins responsible for the fever.

Those who have had experience with these agents can remember the rocky road traveled when a hearing was sought. Anaphalaxis was the bugaboo. Smiles and contempt came from many; in fact, some continue to smile, and the American Medical Association has never committed itself, and probably never will, on this subject. The work on the subject is far from complete.

Our knowledge is so limited in regard to these agents that we travel in a darkness that mystifies.

My work began with the digestion of the proteins, and I took under consideration the poisonous molecule and then this molecule when injected parenterally. We wanted to know whether the vaccines were specific. Fever was produced regularly by using laked blood. It was discovered that almost anything could produce a reticulo endothelium cell multiplication, metals, mustard and even body massage.

We decided that the beneficial effect was from the heat produced and that the reaction was somatic. This we thought was basic when Walshe and Cannon throw a monkey wrench into the wheel and tell us that specific agents can be used to produce a regional immunity, that somatic excitation does not necessarily play a part and that local immunity without somatic immunity is to be obtained by the use of specific proteins and applied to a part such as the nasal mucosa.

For years it has been a routine at the Charity Hospital to administer parenterally foreign proteins in practically all cases of blenorrhea and severe ulcer of the cornea. The results so gratifying that we have neglected to study other agents. However, we recognize the fact that other agents may also be good.

Dr. K. W. Cosgrove, Little Rock, Ark.—Our experience with foreign protein therapy has been very gratifying. Our results agree with Dr. Howell's that a systemic reaction is necessary to produce results. We have tried many foreign proteins not giving reaction without benefit to the patient. There is an ophthalmic condition which responds exceptionally well to this type of treatment. Approximately eleven years ago Dr. Frank Vinsonhaler (now Dean of the University of Arkansas Medical School) demonstrated to me the successful use of intramuscular milk in vernal conjunctivitis (Saemich). Permit me to describe briefly the two types of this disease, so there may be no misunderstanding as to the exact condition to which I refer. Both types give a history of red inflamed eyes. Photophobia and lacrimation may be noted in the acute stage. In the other type a gelatinous looking ring is seen around the limbus, with circumcorneal injection. Never is pannus observed which would differentiate it from trachoma. Smears in these cases occasionally show a few saprophytic staphylococci. Scrapings from the lids will frequently show an increase in eosinophils. Our routine of treatment of these cases has been as follows: fresh skimmed milk boiled twenty minutes is used. Five to 10 c. c. is given every second, third or fifth day, depending on the previous reaction. Usually the acute symptoms subside after at least the fifth injection. The unevenness of the palpebral conjunctiva may remain. During the time of treatment the patient is given an eye lotion, mainly to keep him interested, of 1/8 per cent zinc sulphate in boracic acid. However, results have been obtained where no local therapy was given. About 50 per cent of the cases have had a flare-up the following spring, but subside quickly with one or two treatments. No anaphylaxis was noticed in the return cases.

In concluding I might mention that the differential diagnosis, between vernal conjunctivitis and trachoma (without pannus), can be determined by this therapy, as we have not seen a case of trachoma respond.

HISTOPATHOLOGY OF SINUSITIS*

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Even at the expense of possible reproach for not being conversant with some of the advances which have been made in the study of sinus disease, I venture to state that our conceptions of this condition are not substantially different from those of several years ago. But much thought has been given to the physiologic and biochemical aspects of sinusitis and there are constant and constructive efforts to improve operative procedures designed to cure the infection.

Possibly it is because the histopathologic findings remain forever unchanged, like the Grecian urn, that we are prone to lose interest in a very vital feature of the whole problem. I feel safe to say that most of us have rather lost interest in histopathology; and if this is so, most of us have forgotten much that we once knew. But because some of us would like to refresh our knowledge, if only for an innate desire to know the fundamentals, it seems that such a compendious review as this deserves a place in the symposium.

It will be necessary briefly to describe the histologic arrangement of the tissues of the sinuses before an attempt can be made to consider the pathologic conditions involved.

The mucous membrane of the accessory sinuses is directly continous with that of the nasal fossa and it differs from it only in thickness and glandular content. The mucosa is thinner, the glands are less numerous, and in addition the membrane does not possess the properties of erectile tissue.

The lining epithelium is columnar, ciliated and pseudo-stratified in character, containing many mucus secreting goblet cells. An epithelium which is columnar in character is never of the truly stratified type and pseudo-stratified means that the epithelium, while it is composed of several layers of cells, is so arranged that each layer has some contact with the basement membrane.

The basement membrane upon which the epithelial cells rest is not always easily demonstrable, but it is nevertheless present. It reacts to the specific stains for elastic tissue and is distinctly cribriform in character, permitting pro-

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cesses of connective tissue cells and leukocytes to pass into the overlying epithelium.

The tunica propria or connective tissue layer consists of loose fibro-elastic tissue, rich in cells and here and there are found collections of lymphocytes suggestive of lymphatic nodules. Elsewhere are interspersed occasional single lymphocytes of the mononuclear variety. Characteristically there is an abundant blood supply. The glands which are most numerous in the region of the ostia are of the serous, mucous and mixed type.

In general terms, inflammation is the response of the body to some irritant. Without entering into detail as to the reasons and hypothesis advanced to explain the phenomena of inflammation, we can definitely say that certain results are observed. There is: (1) dilatation of the vessels; (2) diapedesis of the leukocytes or escape of the cells from the vessels into the tissues; (3) exudation of serum into the stroma, causing swelling; and (4) increased proliferation of fibroblasts.

The leukocytes and newly formed connective tissue have phagocytic power. In the course of a mild infection, if the resistance is good, the bacteria are destroyed by phagocytosis or lytic properties liberated by the injured cells, the leukocytes are picked up by the lymph, the excess lymph disappears and there remain only some of the fibroblasts to mark the site of the infection. In virulent infections, the bacteria multiply and the leukocytes, especially those at the center of the infection, are killed. There are thus produced dead leukocytes and bacteria floating in the exuded serum, the combination of which is called pus. In the process, fibrin is also present. It is derived from the serum, having been liberated by the action of ferments from the leukocytes. The inflammatary cells encountered are: (1) polymorphonuclear leukocytes. These are derived from the bone marrow and the spleen and their presence in the tissues denotes an acute infection. (2) Lymphocytes, which come from the lymph nodes and the sheaths of the veins. They are weakly ameboid and phagocytic and are present in chronic inflammation. (3) The fixed tissue cells. These are so called because they are not present in the normal circulating blood, but constitute a portion of the fixed body tissues. They are much more resistant to the infecting agent but less active in combating disease than the leukocytes. Of these there are three varieties: the hyaline mononuclear cell; the plasma cell, which is a large neutrophilic or eosinophilic cell with an eccentrically placed nucleus; and the third variety is the young fibroblast proper.

In a consideration of inflammatory reaction, if the changes in any given sinus are observed, these changes are for practical purposes applicable to any other sinus.

An acute infection may be simple catarrhal. Here the membrane is actually swollen. There is an active proliferation of epithelial cells and outpouring of mucus from the goblet cells and glands. This results in a surface discharge containing mucus, serum and desquamated epithelium. There is marked hyperemia and dilatation of the vessels. Thickening of the basement membrane is never noticed in these or other cases of acute infection. The leukocytic infiltration is not pronounced and the cells are of the polymorphonuclear variety. Hajek is of the opinion that after the subsidence of such an infection complete involution or restitution of the normal histologic picture occurs; but many others believe that a permanent scar is left on the mucosa.

In acute empyema, all of the above changes are found, but the reaction is much more intense. The epithelial layer may be completely cast off in places, and throughout the mucosa hemorrhagic areas are often noted. Edema is less pronounced, but the leukocytic infiltration, chiefly polymorphonuclear of course, is very marked and frank pus is present on the surface. When the fibrin content is high, instead of ordinary purulent secretion, a membrane covers the surface. At times, the infection in a sinus may be so virulent that the periosteal layer and the underlying bone are involved in the production of an osteomyelitis.

Chronic infections of the sinuses may also be catarrhal or purulent in character. In chronic catarrhal infections, the changes are much the same as in the acute variety except that there is less congestion and the infiltration is of small mononuclear lymphocytes and plasma cells. Even in this type, however, there is degeneration of the more highly specialized parts of the mucosa with replacement by fibrous tissue. As the various types of chronic inflammatory reactions merge one into the other, depending upon the duration, it may be an advantage to note the changes without classifying them.

In low grade inflammation, simple hyperplasia and hypertrophy together with cellular infiltration may be the only visible changes, the mucous membrane presenting thickening of the mucosa and submucosa with usually moderate activity

of the glands. When the inflammation is more severe, the epithelium, very often as a result of destructive processes, becomes very much thinned and here and there are found areas of superficial ulceration. Sometimes portions of the mucous membrane or the entire mucosa may be lined by stratified squamous epithelium. This is metaplasia and it is generally conceded that such a transition is the manifestation of chronic irritation over a long period of time. In the submucosa there are varying degrees of edema and fibrosis, the dense fibrotic sections being usually found in long standing infections. There is a marked tendency for the lymphocytes to arrange themselves in clusters about the vessels and glands, but they are of course scattered indiscriminately throughout. If the fibrosis is pronounced, the nutrition becomes impaired as a consequence of pressure on the vessels and the glands and atrophy results. With atrophy of the glands there is a decreased secretion of mucus and ozena develops.

Polypoid changes and polyps are exaggerated examples of edema and fibrosis and although some pathologists consider them true myxomata or fibromata, they lack the histologic characteristics of such growths. They are tumors, not only in the sense that they are swellings; for besides being mere enlargements, they are subject to varying degrees of hyperplasia, rendering them persistent and also progressive. They are usually lined with hypertrophic ciliated columnar epithelium, but they may possess areas of transitional or squamous epithelium and occasionally there seems to be a single layer of flat epithelial cells. The submucosa is composed of loose connective tissue with pronounced edema. Collagen is found in the interstices of the fibrous network. Lymphocytes may be abundant about the vessels and at times large numbers of eosinophils are present.

The behavior of the basement membrane is interesting in chronic inflammation of the sinuses. From a barely recognizable streak in normal tissue, it is sometimes so thickened in disease that it exceeds the height of the epithelial layer. It appears as a homogeneous, hyaline streak or layer which, near the tunica propria, becomes somewhat fibrillar in construction. Shambaugh believes that the basement membrane is thickest where there has been the greatest epithelial desquamation and irritation and that it is the response to stimulation of the underlying connective tissue. Its function, he believes, is to protect the exposed submucosa.

Allergic mucous membranes present ordinary chronic inflammatory changes with minor peculiarities. Whether the allergic state predisposes the mucosa to chronic infection or vice versa has not been satisfactorily determined. There is usually a stratified columnar epithelium with occasional metaplastic areas. The basement membrane is almost universally thickened and the tunica propria shows all varieties of chronic inflammatory changes, namely: edema, fibrosis, and perivascular infiltration, though the infiltrating cells are somewhat different. Besides the common leukocytes, there are sometimes large numbers of eosinophils and eosinophilic plasma cells. The glands are usually actively secreting and this is to be expected when one considers the tremendous amount of secretion the allergic patient expels each day.

THE PSYCHIATRIST IN THE GENERAL HOSPITAL*

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The tendency of general hospitals to seek the opinion of the psychiatrist in fields not strictly mental is indicative of a trend which promises much to medicine as a whole and to psychiatry in particular. This recognition of the psychiatrist's place in the general picture is unique when compared with that of a decade ago when his activity was limited by the walls of his asylum. This state of affairs had persisted from early time when the physician took to himself the body and its diseases, disclaiming further responsibility for affairs of the mind.

Those entrusted with the care of the mentally ill were eventually known as psychiatrists and so we know them today. Nevertheless, the generations which saw this division into the purely physical and purely mental saw many of divergent sympathies, who recognized their needs one for the other. Without casting reflections upon the general medical physician, the fact seems fairly clear that the psychiatrist was probably more fully aware of his need for a firm grounding in the fundamentals of medical science. The

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discovery of the infectious nature of such forms of insanity as general paresis and its resultant derangements of the personality only served to emphasize this need.

Today is seeing a growing recognition of the fact that psychiatrist and physician have similar aims, that they perform comparable services and that they need similar training. It is also recognized that psychiatry, in the past a closely limited specialty, has certain fundamental features which are important assets to anyone engaged in the practice of medicine. Consequently, teaching schedules in medical schools are being revised so that today's graduates may have these advantages.

We are all familiar with this rearrangement of the courses in psychiatry in medical schools compared with the not so far distant past, when classes were chiefly lectures and demonstrations of mental disease, without attempting to give a reason why this patient developed one form of insanity and that patient another. The recognition of different personality types carrying their own potentialities in health and disease has made for a much better understanding not only of those cases which have attracted the attention of the psychiatrist in his specialty dealing with the certified insane, but are of inestimable value to the general practititioner in his dealings with that group of patients who never see a psychiatrist, but who make up a large percentage of the general practitioner's practice, the psychoneuroses.

The interrelationships of general medicine and psychiatry are, therefore, seen as very complicated and the penetration of divergent fields by psychiatry requires that the psychiatrist be extremely versatile in meeting the needs and requirements of all. The purpose of this paper is not to emphasize the indispensability of the psychiatrist as a member of the general hospital staff, but to point out the need for a better understanding of these reactions which complicate the practice of medicine by the imposition of problems involving medical psychology, and also the challenge thus presented to psychiatry in their recognition and evaluation. In this way the psychiatrist not only assists in the economic regime of the general hospital as a member of its consulting staff, but also meets a vital need in the educational facilities of that institution.

Our position as a psychiatrist in an active general hospital prompted us to make a survey of all cases with psychiatric implications during a five-year period. The Firmin Desloge Hospital came into existence in 1933 as the main teaching center of the St. Louis University Medical School. Since then the Department of Neuropsychiatry has expressed an opinion more than 500 times. In approximately two-thirds of these the problem was essentially that of organic disease of the central nervous system brought about either through vascular changes of age, trauma, brain tumor or infection. Of the remaining third, approximately 40 per cent were classical cases of mental disease of major or minor importance, whereas the rest were mixtures of physical complaints complicated by the mental attitude of the individual patient. This in turn influenced to a varying degree the onset and course of the disease.

The physical conditions present were of a wide variety and included the usual run of cases seen in any general hospital, arthritides, cardiovascular disease, diabetes, anemias, uterine disorders, syphilis, thyrotoxicoses. Time does not allow us to go into detail. Likewise, the mental conditions showed characteristics of any and all of the usual reaction types, psychoneuroses, psychoses and psychopathic personalities.

In the treatment of sick patients these problems confront the physician from time to time, whether in home, clinic, or general hospital. They are indicative of disturbances in the adaptive capacity of the individual patient and as such are within the scope of the psychiatrist. Traditionally, the psychiatrist is not supposed to have much to do with general bodily complaints. Historically, he has been specifically concerned with what are called mental diseases. Serious maladaptation has crippled the social efficiency of the individual and estranged him from his fellows. The difference in adaptive failure that one notes in the obviously psychotic patient and those seen in the wards of the general hospital is not so much a difference in kind, but degree. On the one hand the adaptive disturbance is so widespread that it has a devastating effect upon the individual and his entire personality, while on the other hand the failure of adaptive power may mask itself in terms of physical disease where failure to meet the demands of life's situations may show itself in physical symptoms. Then, too, there are instances wherein the adaptive faculty depends largely upon the integrity of the entire psychophysical structure and any impairment of this relationship results in adaptive failure. We are all aware of the potentialities of different individuals in such circumstances as physical loss

through mishaps, accidents, amputations, paralysis, etc., and despite them some persons are capable of carrying on very efficiently, while others are completely lost and seldom if ever regain a semblance of poise. In any case the therapeutic approach makes use of psychiatric principles. Whether they be carried out by the psychatrist or not is of little importance. Nevertheless, as a member of the general hospital staff the psychiatrist is in a good position to evaluate them and recommend that satisfactory psychotherapeutic measures be initiated.

In the treatment of disease in general much depends upon the attitude of the physician himself. He may have been trained in medical school to think little about his patients as people, but to concentrate his attention upon disease. He may pay little attention to factors which make the patient an individual distinguished from his fellows. He may see in the patient nothing more than the embodiment of a disease with a detailed symptomatology, etiology, prognosis, pathological anatomy and treatment. With this point of view he may outline the treatment for some particular disease.

During recent years there has been a growing recognition that the disease has been overemphasized and that the patient has been overlooked. The tremendous strides in diagnostic methods and laboratory medicine accentuated this tendency and the scientific aspects of medical practice reached a high point of precision.

To do justice to the patient, therefore, the physician must take into consideration not only the laws of laboratory procedure, but also the laws which regulate the reaction of man to his environment, even though these laws cannot be formulated in mathematical or precise physical terms. In treating the patient as a subject with a disease, one may look upon the human characteristics of the patient as irrelevant and ignore his life situations, and this may cause one to overlook many factors essential for an understanding of his symptoms. His emotional and

Table A

Physical Diagnosis	No. of Cases
Cephalgia	1
Chronic arthritis (all forms)	11
Rheumatic arthritis (acute)	2
Obesity	2
Cardiovascular disease (all forms)	22
Diabetes mellitus	5
Carcinoma (all forms)	3
Anemias:	
Primary	5
Secondary	2
Abscess:	
Pelvic	3
Perinephritic	1
Uterine disorders:	
Cervicitis	5
Fibromyomata	2
Endometritis	1
Retroversion	2
Gallbladder disease	3
Syphilis (systemic, all forms)	8
Bronchitis (acute)	3
Postoperative adhesions	2
Visceroptosis	2
Hernia	2
Menopausal syndrome	2
Ulcer:	
Gastric	1
Penis	1
Decubitus	1
Bronchiectasis	1
Vincent's infection	1
Chronic gingivitis	1
Chronic constipation	1
Sinusitis	1
Tonsillitis	1
Gastric hyperacidity	1
Posterolateral sclerosis	1
Pneumonia	1
Nephrosclerosis	1
Dermatitis, nutritional	1
Intestinal obstruction	1
Pyelitis	1
Cystitis	1
Gas gangrene infection	1
Ankylosis	1
Fractured rib	1
	109

Table B

Psychiatric Diagnosis	No. of Cases
Psychoneuroses:	
Hysteria	19
Neurasthenia	6
Anxiety state	5
Hypochondriasis	5
Gastric neurosis	1
Syphilophobia	1
Claustrophobia	1
Unclassified	10
C. N. S. lues (all forms)	6
Cerebrovascular disease	6
Dementia precox	4
Paranoid reaction types	3
Psychopathic personality	3
Affective reaction types	3
Toxic psychoses	2
Epilepsy	2
Thalamic syndrome	1
Sympatheticotonia	1
Psychoses due to drugs (barbiturates)	1
Traumatic encephalitis	1
Multiple neuritis	1
Spinal puncture reaction	1
Sciatica	1
Mental deficiency	1
Meningismus	1
	86

instinctive life, family pattern, economic and social situations may be essential factors in understanding and treatment where symptoms may not at first suggest a complex origin. A consideration of these factors makes intelligible such symptoms as persistent headache, insomnia, gastro-intestinal disturbances, fainting, palpitation, variations in blood pressure, frequent attacks of vertigo, refractive disorders, pelvic and abdominal complaints. Such symptoms are understandable not only in the sense that they are physical manifestations of conflicts arising within the personality as seen in the psychoneuroses, but oftentimes as expressions of both physical and mental inadequacy which may be symptomatic of a definite physical disease.

Our first case expresses emotional and economic insecurity in terms of a physical disease which was genuine, but which in turn liberated more definite trends of emotional instability.

The patient was a 48-year-old housewife, admitted to the Firmin Desloge Hospital on two occasions, first in June, 1933, a few months following the death of her husband. Her complaints centered about her gastro-intestinal tract and were essentially those of abdominal fulness and bloating, obstinate constipation, frequent bleeding, nausea and vomiting and terminal pain on urination. All symptoms had been present for the previous five years, but more intense during recent weeks. The last menstrual period was reported at the age of 41.

On physical examination she was found to have a temperature of 101.8° and generalized tenderness over the entire abdomen. Later examination showed tenderness over the gallbladder and right kidney, and cystoscopic examination showed a bilateral nephroptosis with impaired drainage at the uretero-pelvic junction.

Her temperature was persistently high for over six weeks. At times she was definitely confused and psychotic. She improved mentally and was discharged September 7, 1933.

She was readmitted on October 4, 1935, complaining of extreme nervousness and frightful experiences at night, when she would awaken screaming following a nightmare. She experienced chilly sensations, shaking from head to foot, and frequently awoke drenched with perspiration.

Her physical examination at this time was entirely negative except for a mucous colitis and sinus arrythmia.

Further investigation of her background brought out the facts that as a child she described herself as idealistic. She had desired to be an actress and had achieved considerable prominence in amateur and semi-professional theatricals. When she was married she had to give up much of this activity, but still coached amateur groups on one occasion or another. She interested herself also in philanthropic enterprises, from which she derived a great deal of satisfaction in such situations as would call forth an emotional response.

With all of these interests and activities she carried on quite successfully until her husband's death in 1933. This precipitated a strong emotional response and besides made her financial security uncertain. She decided thereafter to go into the funeral directing business inasmuch as this would not only provide her financial security, but would also allow her emotional expression to have an appropriate outlet. Her venture was for the most part successful, but she did not take into consideration the fact that her business had to be approached from the practical side as well as the emotional. Several incidents occurred in which the value of her work was not appreciated by the families of persons whom she had cared for. The most recent was a week before admission to the hospital and concerned a friend of many years' standing who had set aside a certain amount of money for her own funeral which the patient in due time arranged for. Some distant, though closest, relative of the dead person hearing of these financial resources immediately canceled all funeral arrangements and ordered that she be buried as cheaply and quickly as possible without a funeral.

Such experiences repeating themselves at regular intervals tended to increase her instability until the last incident precipitated a breakdown.

In considering this case in its entirety it can be seen that at no time could the patient's physical complaints or emotional disturbances be considered as the entire problem. In other words, the physical as well as emotional aspects had to be considered separately and individually.

Our next case presents a problem similar to this and involves an interrelationship of conflicts both religious and economic brought to a climax by a physical derangement.

The patient was a 29-year-old housewife admitted to the hospital because of dizziness, fainting attacks and periods of unconsciousness of 11 months' duration. The onset followed shortly after an explosion which wrecked a filling station operated by her husband and destroyed their household equipment, as they made their home in the same building. There were also periods of shortness of breath following exertion and this seemed to precipitate her attacks. The unconscious periods lasted ten to fifteen minutes and she was tired for several days thereafter.

The patient was married twice, the first time at 18 years of age to a man who was quite abusive. Shortly after the birth of her first child this man deserted her and she has not seen nor heard from him since. She remarried again within a few years. A second child was born five years before I saw her, but following delivery menstruation became irregular and surgical measures were necessary for treatment, resulting in the removal of much ovarian tissue. Since then there had been a gain in weight of about 100 pounds.

External indications revealed compatibility in the marriage, although the economic status and industrial conditions in general had created some friction. There had also been a great deal of worry and anxiety on the patient's part during the past six years concerning her 9-year-old son, who is an accomplished dancer, but whose training and general care had been in the hands of a dancing school. His aptitude as a dancer had been so notable that the manager of the dancing academy had practically taken him into his own family. Efforts on the part of the patient to regain control of this child had been rather dramatic. They were first opposed by the dancing master on the ground that his future as a

dancer would be much better if he remained in his care. Later, she was directly opposed by him in court when he brought action against her on the grounds that she was unfit to care for her child. This entire situation was fraught with all sorts of legal difficulties, most of which were extremely vague to the patient.

On physical examination she was obese and markedly overweight for her height. Hirsutism of the face had been noted for the previous seven to eight months. The heart was enlarged to the left and irregular. The blood pressure was 105/70. The spinal fluid was under slightly increased pressure, but the dynamics were normal. Sugar tolerance test showed a hypoglycemic curve; x-rays of the gastro-intestinal tract and the skull were entirely negative. Neurologic examination was essentially negative, although during the course of an examination the patient grew faint and cyanotic and fell to the floor without hurting herself. At this time there was an increase of both heart and respiratory rate and she became cyanotic.

Additional history was obtained that frequent episodes of sugar hunger were elicited and effort was made to associate this syndrome, her obesity and her cyanosis with a pituitary tumor. However, further investigation failed to verify the presence of an intracranial neoplasm and in the last analysis this was considered as a polyglandular syndrome.

In this instance can be seen a mixture of emotional instability, with physical complaints which were definite. The earlier history of marital incompatibility, difficulties in family management undertaken in an inadequate fashion are all of interest in the light of her physical complaints and her physical disease, which was also recognizable.

Our next case is that of a mixture of functional symptoms which appear at an early stage in a more severe organic disorder, in this instance affecting the central nervous system.

The patient was a 52-year-old male, admitted to the hospital on April 26, 1937, complaining of vomiting and loss of strength. The onset of the vomiting was about three weeks prior to admission. The loss of appetite was noted as early as the latter part of January, 1937. At the same time he began to notice that he had pains in the small of the back. On admission he said that he could not hold anything down and that people told him he always looked yellow just before he vomited. Coffee nauseated him particularly, whereas tomatoes, apples, dried foods and wine were agreeable. He was noncommittal so far as cabbage, chile, or fatty foods were concerned.

Two or three years prior to admission he had noticed blood in his urine. He was subsequently treated by physicians for kidney trouble, anemia and arthritis. Recently he had experienced pain radiating down the anterior surface of the leg and toward the testicles. He had also fainted recently on two occasions. These fainting attacks resembled convulsions somewhat, but the description of relatives was very indefinite. By many they were thought hysterical because for some time he had been worrying about financial troubles, particularly since he was the sole support of two sisters about his own age who seemingly enjoyed ill health.

On physical examination he appeared undernourished and emotionally unstable. The tonsils were enlarged. X-rays of the gastro-intestinal tract and cardiorespiratory system were negative, as well as electrocardiograms.

He remained in the hospital for two weeks, when he was discharged, his condition unchanged, with diagnosis of gastric neurosis and neurasthenia.

He was seen frequently in the following months. His general status remained much the same until July, when he went to the country and with rest gained weight.

He was readmitted to the hospital on September 2, 1937, complaining of severe headache, dizziness, loss of memory, dysarthria and dyspraxia.

Neurologic findings at this time showed a marked aphasia, chiefly motor. Reflexes in right upper extremity were more active than those in the left, and coordination in finger to nose tests was poor. Ventriculograms showed marked cortical and convolutional atrophy.

Following air studies he was irrational and psychotic for several days. Then followed a gradual recovery until October 25, 1937, when he was discharged as improved. Following discharge he returned home, where he remained for about a month. He contracted an intercurrent infection and died December 15, 1937. Autopsy was not obtained.

In summarizing this case it can be seen that the onset of his illness was ushered in by numerous symptoms which one might consider indicative of functional nervous disease: nausea and vomiting, various aches and pains and a fainting attack which many thought hysteria. However, these symptoms really occupied but one phase in a severe organic degenerative disease of the brain.

Our last case is that of a 48-year-old clergyman who was admitted to the hospital in August of 1937 for an exploratory laparotomy. For the preceding 18 months he had been complaining a great deal of many things. To begin with he had headaches, backaches, temporary periods of nausea, was not resting very well, and in general felt indisposed.

His past medical history was essentially negative. He had always enjoyed very good health and was considered by many an extremely robust individual, straightforward in all dealings with himself and others. During the previous eight years he had been confined to a church heavily in debt due to injudicious investments by his predecessor. During this period he reduced the debt from over $150,000 to a figure closer to $85,000. At all times he seemed extremely phlegmatic, happy-go-lucky and seemed little concerned over worries domestic, financial or physical, so that when he began to complain it was felt as though he was actually ill. On original examination the findings were entirely negative. He then consulted another physician, who examined him thoroughly with still negative findings. For the next several months he visited different clinics in the same and near-by states, remaining at these institutions for little more than cursory examination.

During the spring of 1937 he seemed considerably agitated at times, at other times detached and confused, misidentifying people and getting lost on the floors of the hospital familiar to him for many years. At this

time he returned to his original physician for further advice and consultation with a gastro-enterologist was suggested. For this purpose x-ray studies of the gastro-intestinal tract were ordered, but before these could be made he had a gastric hemorrhage which required transfusion. When his condition had improved to the point where further investigation could be attempted he re-entered the hospital. On operation a carcinomatous mass was found in the lesser curvature extending to the liver and also the aortic glands and structures in the mediastinum. Postoperatively his course was progressively down hill and he died on October 10, 1937.

In this case the early symptoms were also essentially those of a functional nervous disease and for several months he was thought to have a psychoneurosis such as hysteria or anxiety state, but these, like those in the foregoing cases, were merely indicative of a more serious underlying organic trend. The symptoms of mental disease could probably be explained either as intracranial metastases which produced clinical symptoms before the original focus of the malignancy had reached any appreciable size; or the malignancy had reduced his general efficiency to the point where he was no longer able to carry on his work at its former level, and the recognition of this latter fact had liberated various functional trends heretofore never of any significance.

In the time at our disposal it is impossible to go into any deep or prolonged discussion of the psychoneuroses. However, it is gradually becoming a recognized fact that functional elements are widely prevalent throughout medical practice despite the attitude of many within the profession who have felt that mental states were in no way related to physical states.

In dealing with such situations it is true that hard and fast rules cannot be dogmatically presented. A contribution can be made, however, to their better understanding which I am sure will prove helpful. It is for this reason that psychiatry has attracted the attention of many of our medical schools as a necessity in the training of physicians. I do not mean psychiatry as a specialty, but as a fundamental branch of medicine. This latter concept is perhaps a wide departure from psychiatry as we know of it in the state hospital or in dealing exclusively with insane people.

It is in this latter point that one must differentiate the psychiatrist as a specialist and the psychiatrist as a fundamentalist.

In the general practice of medicine we recognize that certain features are gained from fundamental facts which are gathered from various phases of medicine, whether they be otology, ophthalmology, obstetrics or any other specialty.

Such fundamentals are also obtainable from psychiatry and can be summarized down to a knowledge of the various phases and aspects of personality development. The personality as a whole is a reacting organism, disturbances of which manifest themselves in many ways.

Sometimes the personality as a whole is singularly inadequate to meet all or any of life's situations and it is not strange to note the presence of functional nervous trends at practically all phases of the individual's existence. At other times we find a personality which is unusually adequate to meet any and all situations which life can concoct for it and enjoy each and every one. In such an instance the appearance of functional trends is most unexpected, and if they do appear they may be merely resonant of some underlying organic trend.

In the evaluation of these trends much depends upon the history of the individual himself. If his inadequacies have been present during his entire life we may be able to evaluate the complaints accordingly; but if after a relatively successful career the complaints begin to show themselves, our evaluation must be most considerable.

It can be seen, therefore, that the general hospital offers a relatively fertile field in which the fundamentals of psychiatry may be implanted with almost unlimited possibilities. These will direct themselves toward a more adequate understanding of the problems involved by the intern staff for whose education and training all of us have more than a casual interest. This does not mean that the psychiatrist must in any way sacrifice any of his hard earned prestige, as there will always be a need for the specialist. It does mean, however, that a community of interests can be aroused in the most divergent groups to the mutual betterment of all.

DISCUSSION (*Abstract*)

Dr. H. H. McClellan, San Antonio, Tex.—Psychiatrists can most advantageously reread the work of Dr. Henry Cotton, of Trenton, New Jersey, entitled "The Defective and Delinquent Insane," in which he establishes a theory of physical auto-intoxication and infection which I can assure you, after fifteen years of experience with this theory, is far nearer the correct approach to the major nervous and mental disabilities than any other theory as yet devised, as expressed in terms of improved or recovered patients.

I would further suggest that we devote more attention to the possibilities of an abnormal cerebrospinal

fluid pressure in these cases. This statement is made in the knowledge that standard textbooks deny that the pressure is other than normal in the great majority of the psychotic states. Let us revamp our instruments, recheck our results, and if a technic of the removal of at least 100 c. c. of fluid replaced with 60 c. c. of air be carried out, the results will be most astounding.

After fifteen years of trial and error I believe that this work can be demonstrated to the entire satisfaction of the most dubious and skeptical.

After many years of close association with the mentally sick, I must confess that they have got under my skin, and anything which can be done to change our present nonproductive, fatalistic concept of this disease process will not be in vain.

Dr. Britt (closing).—I might call your attention to the situation as it exists at St. Louis University Medical School.

Our department is one of neuropsychiatry and problems, whether neurological or psychiatric, are handled by one and the same department. The problems of organic disease of the central nervous system are recognized for the most part by the other departments and the department of neuropsychiatry is usually called for the purpose of confirming or disproving their opinions.

However, the recognition and treatment of mental reactions such as those contained in this paper are left largely to our department.

A STATE-WIDE PROGRAM IN HEALTH EDUCATION*

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Last week there was held in New York City a two-day National Conference on Health Education, which may well have important significance over the next several years. It was not a huge convention of the traditional type. No lengthy formal papers were presented. Attendance was small, scarcely exceeding forty to sixty at any one session.

The claim for significance derives from four points. First, the participants were a working group of outstanding national leaders in various fields of health education. Secondly, they represented nearly every major agency and professional group, official and nonofficial, in the fields of both health and education, that have an interest in health education in schools. Again, they were sitting down together for the purpose of seeing how their diverse resources and manifold services could be correlated and coordinated to yield more effective health education in the public school system. Finally and most important, there resulted the setting up of a "National Committee on Cooperation in Health Education," representing all related agencies, with provisions for a smaller Executive Committee. Thus was crystallized into an attempt for operating relationship on a major national scale a growing attitude towards cooperation between schools and health agencies which the writer no longer hesitates to recognize as a significant trend in modern health education.

In the light of such encouraging developments in the American scene, it seems appropriate to describe here a state plan for health education which has been developed from its origin eight years ago continuously and consistently in accordance with the idea of providing closely-knit and harmonious relationships between the great forces of organized health and organized education. This plan incorporates certain structural and functional patterns that are designed to facilitate cooperation between the respective state and local departments under conditions adapted to governmental organization in the rural South.

THE PLAN IN GENERAL

The objective of the state plan is to provide ultimately for all the people, in school and out, educational service for health, on a community-wide basis, and with the concept of health education as not merely a collection of academic facts, but as a dynamic and essential force in health protection and promotion. This purpose was originally phrased in 1930 in the University of Tennessee--Commonwealth Fund Project Outline in the following words:

> "For effectuating health knowledge and health practices in the various communities to the end that the vital resources of the whole people be most highly developed and effectively conserved."

If health education is to be thus widely available, its dissemination will obviously require the services of all agencies and personnel that can contribute. This implies that the school may be the heaviest contributor to the part of the population that is of school age, and the health department may be the principal organization for reaching infants, preschool children, and adults, but it also implies that each agency can be substantially assisted in rendering its share by cooperation with the other, and both can benefit by the supplementary assistance of many additional groups.

Such community-wide objectives require that planning be directed to the content, methods,

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and personnel for health education in the elementary school, the secondary school, the college and university, and among the adult populace. In addition to the questions of what shall be done, how shall it be done, and who shall do it at these various levels, there also arises the question of how shall the participating personnel be prepared, trained and qualified for the expected services.

What is first needed is not primarily a matter of wholly new and original content and methods, as compared with previous successful health education efforts in isolated locations where good work has already been done in Tennessee or elsewhere. Rather, the initial demands are for administrative designs that will yield a new extensiveness of universal field operation, and for a personnel training program that will make more widely available teachers, professional health educators, and supervisory local leaders who are adequately prepared technically and are imbued with a new viewpoint of health education in terms of major community health problems. Moreover, suitable teaching materials must also be more generally obtainable.

Since it is obviously impossible to cover in limited time all details of the plan, attention will be directed primarily to those administrative and training features which are essentially new in the manner and degree to which they include provisions for cooperation and coordination between health and education agencies in these endeavors.

ORIGIN AND EARLY DEVELOPMENT

Of possible interest is the fact that the early leaders in this program selected as the initial problem to be approached the need for training personnel, beginning first of all with the school teacher, rather than commencing with efforts for extensive field operations. And significantly also, the inauguration of this initial effort was made as a joint endeavor of the State Department of Public Health and the College of Education of the State University, to which financial assistance was contributed by the Commonwealth Fund. Thus were public health, public education, and public minded private philanthropy assembled in a cooperative relationship at the very outset, effective in January, 1931.

The first few years were devoted largely to the building up of cooperative relationships within the University between departments in the natural sciences, the social sciences and the field of education, all of which were seen to be related to teacher-training in health, and to the establishment of cooperative relationships between the University and surrounding health agencies and health-interested lay groups, which were also recognized as being in position to contribute to health training for teachers. Basic plans and materials were built up for courses and curricula in health education which would draw cooperatively from these contributory resources both within and without the University itself.

As the next step towards expansion into a state-wide program, there entered about four years ago into mutual participation two more principal agencies, the State Department of Education and the Health and Safety Department of the Tennessee Valley Authority. Thus there came about the present shoulder-to-shoulder tie-up in the cause of health education of four state and regional agencies, namely, and to repeat for emphasis, the State Department of Health, State Department of Education, State Teacher-Training Institutions, and the Tennessee Valley Authority.

The lining up of four such agencies encompassing the principal planning facilities and operating organizations for conducting health education from a community-wide viewpoint and dedicated to joint efforts for the solution of their commonly recognized mutual objectives and responsibilities, is in itself one of the most original and significant features of the State Program under discussion. Attention will now be turned to some of the mechanisms by which this cooperative endeavor is carried into coordinated action.

STATE PLANNING COMMITTEE

First should be mentioned the setting up of a planning committee, representing all the agencies. This is composed of the executive heads of all four organizations, and thus includes the State Commissioner of Health, State Commissioner of Education, Director of Health of the Tennessee Valley Authority, and the President and Dean of the University of Tennessee. Other members include the Dean of the College of Education at the University, the Chairman of the Faculty Committee on the Health Education Project, the Professor of Health Education, and the State Coordinator for Health Education. This group meets from time to time, reviews progress and problems, and determines next steps of development. This State Planning Committee was formed in 1935.

COORDINATION AT THE STATE LEVEL

In the same year there was created in the

program a rather unique staff position, already mentioned, under the title of "State Health Education Coordinator." This person, whose previous experience had been extensive in the fields of both public education and public health, serves two primary functions. The first of these is to concern himself with operating details in the development of the program which involve intra-relationship between the four central agencies in the Planning Committee. His second function is to develop promotional inter-relationships between the Planning Committee and local field personnel, such as county school superintendents and county health officers. The State Coordinator also meets important lay groups which are interested in health education, such as parent-teacher associations and others. It should be recorded at this point that the State Coordinator is organically connected to all of the principal agencies, the position being by all four maintained; this permits him to approach any of them as a member of their own staff, or to approach local field persons as a representative not only of the Planning Committee but also of the most appropriately related individual agency (as to county superintendents of schools from the State Department of Education).

COOPERATIVE TRAINING PROVISIONS

Correlation between the major health and education agencies actually goes much further than mutual planning and joint support of the State Coordinator. Working cooperation extends through the range of personnel training and development of materials into the realm of local field supervision.

The University.—The University, through its College of Education, sees as its responsibility several functions, which involve health education for its student body, research, and personnel training. While something has been done along all these lines, the greater relative progress in these early years of program building has been in the last named phase, personnel training. Here the following responsibilities have been recognized:

(1) A minimal but advanced amount of preparation for health teaching on the part of every general elementary teacher.

A start along this line has been begun with revision of the general elementary curriculum for the B.S. in Education, effective on entering students this fall. Under this revision, all future general grade school teachers pursuing a four-year program will be required to take some foundational work in basic natural and social sciences, an introductory course in nutrition, a physical education course dealing with games, play and recreational direction, a hygiene course in school health problems, and a public health education course entitled "The Function of the Elementary School in Promoting Community Health." Some of these requirements, including the last named course, will even hold good on students taking only a two-year teacher-preparatory program.

(2) A more intensive program for persons who wish to specialize as health teachers.

To this end, there have been provided two complete four-year curricula leading to the B.S. in education. One is for elementary health teachers, the other for high school health teachers. The latter represents a combination which qualifies for simultaneous preparation and state certification as a teacher of biology, general science, or home economics and nutrition. Both curricula are designed on the philosophy of laying a strong factual foundation in eight or nine natural and social sciences, which are called "core subjects in health education," followed by the work in general education necessary for all teachers, and capped by a full year of study in "Perspectives and Methods of Public Health Education," which deals with application of the earlier foundations in health teaching.

(3) A graduate training program for service as professional health educators in health agencies and for positions of county supervisory and directional leadership under a new type of position which is being called "Local Health Education Coordinator," which will be later discussed.

This graduate program is in operation, but needs fuller development in the future.

While other University contributions are recognized, time will not permit their discussion here. Rather should attention be directed to ways in which the forces of health and of education are cooperating in the carrying out of the University's responsibilities. Such cooperation with regard to personnel training embraces services, materials and financial aid.

In brief discussion of these points, it should be mentioned that members of the staffs of several health agencies serve as contributing lecturers in the teacher-training courses and are providing field trip experiences in which the public health problems and programs of these agencies afford opportunity for the use of sur-

rounding communities as laboratories. Teaching materials are furnished from such sources and equipment is loaned for use in College of Education classes. On the financial side, the State Health Department is assisting the University in faculty salaries, operating expenses including travel, and by the purchasing of visual apparatus and materials. Moreover, the same agency is offering a limited number of fellowships for the graduate training of future local coordinators, which also aids thesis research at the same time, and is planning for next year to participate with local county groups in the financing of summer school scholarships for teachers now in service, in order to equip them to be better health teachers on return to their regular positions.

It is of course obvious that determination of the training program for general teachers, special health teachers, and graduate leadership in health education has benefitted not only from the best thought in many departments of the University, but also from the ideas of all the major agencies, as represented by the State Planning Committee.

The Teachers Colleges.—With regard to the State Teachers Colleges, plans for extension therein of training provisions similar to those of the University, in so far as they are appropriate to these other institutions, are under way and an active beginning has already been made in one college where health agency assistance in planning, in services, in materials, and in financial aid is already in effect. Moreover, a steering committee has been appointed by the State Commissioner of Education, which will represent not only his department but also all the teachers colleges, the University, the State Department of Health, and the Tennessee Valley Authority, in fact the entire Planning Committee (via the State Coordinator and others), in the development of a required program of preparation for health teaching to apply to all students in all teachers colleges, which may ultimately be included in the regulations for certification for all teachers.[1]

COOPERATION ON MATERIALS

As was implied in an earlier statement, the forces of public health and public education are cooperating in the matter of teaching materials, not only in regard to distribution, but also in the production of new materials. Only a few instances can be cited, for lack of time. As one example in point, the State Departments of Health and of Education have, in the last two years, collaborated in the preparation of a new sanitary inspection score sheet for schools, which has been specially designed to facilitate educational study by the teacher and pupils to carry on after the inspection by the sanitarian.[2] This form has been provided with an interpretative manual to aid in such further study.[3]

In the publication of recent bulletins from the State Department of Education, dealing with methods, units and projects for improvement of classroom instruction, contributions to health teaching have been made by members of the State Health Department and the Department of Public Health Education in the University of Tennessee, both of whom incidentally also represent the State Planning Committee.[4,5] The Field Secretary of the State Parent-Teacher Association, who was formerly Associate Professor of Health Education in the University, also cooperated on one of these issues.

Of particular significance has been the remodeling of the monthly bulletin of the State Health Department, *"Health Briefs,"* into an organ for classroom application by the school teacher. This transition, under the guidance of the Commissioner of Health, and of the State Coordinator as Editor, has been accompanied by enlargement of the monthly circulation from 1,400 in August, 1937, to over 14,000 since January, 1938. Practically all of this increase is going to teachers throughout the State.

There is now under way a project to develop this year in all the 600 high schools in the state a teaching unit on tuberculosis. Again it is an example of cooperation and coordination. A selected packet or "kit" of materials will be furnished free to all high schools. The State Health Department is purchasing some of the components of the kit from the National Tuberculosis Association, through the State Association, and is also preparing a special new bulletin on local Tennessee data. The Coordinator is guiding the assembly of these materials. The high school supervisors of the State Department of Education will place 800 kits in use in the schools, and will aid teachers in developing the units.[6]

By way of materials for study by the more general public as well as by school people, the State Coordinator and the Department of Public Health Education in the University have recently cooperated with the State Congress of Parents and Teachers in the preparation of a chapter entitled "Health and Education Working Together," which has been included in a new book on the public educational system of

Tennessee, just published by the Parent-Teacher Organization to the extent of 60,000 copies.[7] These handbooks will be used for adult study classes locally all over the state.

COOPERATION IN SPECIAL RESEARCH

By way of measurement of needs, effectiveness of present teaching, and adequacy of teacher-training in those aspects of health education which deal with nutrition, a study of high schools in all 95 counties of the state has recently been completed as a doctorate dissertation in the Department of Public Health at Yale Medical School by a former Commonwealth Fund Fellow in the Tennessee Health Education Program.[8] Cooperative assistance in the field conduct of this study was contributed by the State Departments of Health and Education, the Tennessee Valley Authority, and the Departments of Nutrition and of Public Health Education in the University of Tennessee.

THE LOCAL HEALTH EDUCATION COORDINATOR

The picture here attempted would not be complete without a description of cooperative provisions for county field leadership, under the type of position previously mentioned as "local health education coordinator." This set-up is intended to strike at the core of one of the most important of all problems involved in making any health education program function effectively, namely, well qualified working supervision in field areas.

The particular pattern for local direction and supervision represented by the Coordinator has recently been characterized by a recognized national authority in his report on a field survey of the State Plan as "a unique contribution of the Tennessee Program."[9] During recent months the State Health Department made a canvass of all states in the attempt to locate other areas conducting identical programs with which experiences could be exchanged. No instances of exactly similar provisions for coordinated local leadership were reported, though replies were received from about 40 states. As would be expected, there were recorded several instances of the achievement of somewhat parallel results functionally, but under different structural and financial set-ups.

The basic design of local coordinator service in Tennessee is for a single, well-trained health educator to be attached jointly in a county to the local departments of both health and education. Part of this person's time is then spent under the direction of the superintendent of schools as a supervisor of health instruction, working through the regular teachers. The rest of the coordinator's time is spent in health education activities with adult study groups, lay committees, and general mass measures. These activities are under the direction of the county health officer, and serve both to supplement the educational efforts of the specialized personnel in the health department and to correlate them for greater educational interpretation and impact.

Such positions can be financed not only by the attendant sharing between county health and county education, but also by subsidies from state health and state education. The resulting four-way split permits low cost to any one agency. Thus the coordinator design serves to meet practical financial expediency in rural situations. However, it goes further than this and stands on its own merits as yielding a long desired but seldom achieved degree of closer working cooperation between public education systems and public health agencies in their mutual interests in health education for the entire community. Needless to say, valuable contributions from many other agencies can often be brought to a focus through the coordinator.*

By way of extremely brief history, it might be noted that the coordinator concept in Tennessee, functionally and structurally as described above and under this precise terminology, was originated in 1934. It was first described in privately distributed reports[10] in 1936. The first working trial was inaugurated in Washington County in that same year. Two other proving ground demonstrations have since been launched and others are under negotiation. Results so far offer evidence that considerable success may attend this type of service.

In 1938, specified training qualifications for coordinator personnel were officially adopted by the State Public Health Council. A copy of these minimum standards is attached below as an appendix.

Considerable interest in this type of position has arisen over the country. In 1937, following a Health Education Institute meeting in New York at which the local plan was described, the Health Education Section and the Health Officers Section of the American Public Health Association named delegates to a Committee on Coordination in Health Education, to which

*Some of the working advantages of the coordinator plan have been briefly described in the chapter in Tennessee's Public Schools previously cited[7] (see pp. 181 and 182).

the United States Public Health Service and the United States Office of Education were invited to designate representatives. It is understood that delegates from the field of school administration will later be named, with the possible subsequent formation of a Joint Committee of the American Public Health Association and the American Association of School Administrators. The above committees are expected to make an extensive study of existing local instances where school and health agency cooperation and coordination are in effect in the United States under provisions similar to the Tennessee Plan, or functionally similar but under different structural and financial arrangements.

SUMMARY

In conclusion, there has been presented a necessarily brief description of a state-wide plan for health education intended to reach entire communities, and built, from planning at the top, down through personnel training and the furnishing of study materials, to local field leadership at the working bottom, on the idea of mutual cooperation between the agencies of public education and of public health. Many of the beginnings of practical execution have necessarily been on a small scale, some of the progress has been slow; no claims for a panacea pattern for universal adoption are asserted or intended to be implied; however, the plan is comprehensive in its concept, the opportunities for functional coordinaton are many, and it is hoped that by the testing of certain definite patterns in the design, answers, whether "yes" or "no" may be obtained in the rather near future for certain of the difficulties resulting from isolated, rigidly departmentalized efforts at health education in the past.

APPENDIX

TRAINING QUALIFICATIONS FOR HEALTH EDUCATION COORDINATORS

The qualifications required of health education coordinators as adopted by the Public Health Council of the State of Tennessee in July, 1938, are as follows:

(1) The coordinator must have had foundational training in the health-contributory natural sciences, such as bacteriology, biology, chemistry and nutrition and in the basic social sciences, such as psychology, sociology and economics.

(2) The coordinator must have a master's degree or equivalent in training or experience.

(3) Special training or experience, or preferably both, in health education methods, including the preparation and use of visual material, and in perspectives or principles courses in public health or public health education are required.

(4) Age, personality and experience will be taken into consideration, but these factors will be dealt with individually for each applicant.

(5) The coordinator should have had some successful teaching experience amounting to two years or more.

(6) A basic foundation in education, including educational methods, educational psychology, practice teaching, etc., is also required.

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3. Manual for Scoring Rural Schools in Tennessee, in Connection with Form No. 339. Tenn. Dept. of Public Health, 1937.
4. The Tennessee Program for the Improvement of Instruction: A Guide for Elementary Teachers in the Use of State Adopted Textbooks. Tenn. Educ. Bul., **14**: No. 7, Nov., 1936.
5. The Tennessee Program for the Improvement of Instruction: Looking Ahead with Tennessee Schools. (Bulletin) State Dept. of Educ., 1937.
6. Health Briefs, **15**: No. 9, Sept. 15, 1938.
7. Tennessee's Public Schools (Dean Fred C. Smith, Editor). Tennessee Conference of Parents and Teachers, Inc., Arlington, Tennessee, 1938.
8. Morgan, Lucy S.: An Evaluation of School Health Education in Secondary Schools in Tennessee, in Terms of a Study of Dietary Hygiene. Ph.D. Dissertation. Yale University Library, 1938.
9. Hiscock, I. V.: The Tennessee Plan of Health Education: A Report (to the TVA and the Tenn. Dept. of Public Health, mimeographed document), June, 1938.
10. White, R. H.; Allen, P. W.; Harris, Cara L.; and Walker, H. H.: Tennessee's Public Health Education Program: Report on Progress and Plans Submitted to the State Planning Committee, June 22, 1936 (mimeo document).

DISCUSSION (*Abstract*)

Dr. P. E. Blackerby, Louisville, Ky.—Dr. Walker has given us a splendid presentation of the health education program in Tennessee and has called sharply to our attention the need for coordinating health education as carried out in public health programs with the teaching of public health by the educational forces in the State. I think the Tennessee plan is an excellent one and could be followed by other state and local health agencies to very good advantage.

I am particularly interested in the fact that the Tennessee program is being carried out with cordial relationships between the State Department of Health, the State Department of Education and the State University, and of course this is necessary if the plan is to succeed. Public health has made rapid strides in the last decade and there has been too great a tendency to set up health education programs independently, and from the standpoint of the public this is, of course, unfortunate. The Tennessee program, therefore, would seem to break down any misunderstandings on the part of the people.

In Kentucky we are trying to link up our staff education with the education of the public in matters relating to public health, and in our several district health meetings always try to emphasize the educational phases of every public health subject presented, the first thing being to bring out the newer knowledge in regard to each and every health subject, and then the need for practical application of this knowledge for the public's enlightenment. We have seven district groups that meet bimonthly which all health officers, public health nurses and sanitary officers are required to attend. The morning programs are devoted to papers on various

health subjects and the afternoons are given to round table discussions, the entire group listening in on the morning programs, with the group broken up for the afternoon round tables. We believe that we are accomplishing good results, but feel that we are far short of the Tennessee plan in the matter of coordination with the other teaching agencies in the State.

Mr. Walker (closing).—In staff training of employes in their own lines of professional duty, several not unusual things are being done in Tennessee. Opportunities are afforded as elsewhere for attendance at short-term postgraduate courses and for selected individuals to occupy full-year fellowships. The traveling technical field staff of the State Department of Public Health assists local workers in improvement of service in their own jobs. Annual state conferences of all professional workers are held, and there are several district public health associations conducting monthly evening meetings in various areas of the State. Many local units hold regular weekly or semimonthly staff conferences. Educational ideas, procedures and materials are conveyed through the monthly bulletin, *Health Briefs,* of which the alteration to greater emphasis on health education has been described in the main paper. Whenever a local area is contemplating inauguration of coordinator service, the nature of the proposed appointment is thoroughly discussed with both health department and school authorities by the state coordinator and by others. The planning of the new program is based on conferences of a widely representative local committee, assisted by heads of the participating state and regional agencies. The services of the state coordinator and of the University Professor of Public Health Education are always available on call, as the local program develops, and thus contact is maintained periodically.

We are fully conscious of the urgent need for more intensive efforts towards staff education in the basic principles and methods of sound health education, and towards an enlarged concept of the nature and potentialities of coordinator service among all other employes in the field of public health. We hope that improved provisions in this direction can be attained in the further development of the health education program.

As to the question of exact financing of the state coordinator and the placement of administrative responsibilities in this set-up, it should first be explained that this person is strictly on the payroll of three agencies and is afforded office space and working facilities by the fourth. Travel expenses are furnished among the agencies in a manner determined by mutually agreeable arrangements. In negotiations between the central agencies or between them and field personnel, the state coordinator is a correlating and interpreting functionary, but does not usurp administrative authority from the head of any agency. For instance, he may urge but cannot commit the State Department of Education to an executive policy that may seem desirable to others concerned. He becomes able, however, to carry into the field an order of the State Commissioner of Education if and when he is so delegated and empowered by that Commissioner. Disposition of his time is a reciprocal responsibility between himself and the needs expressed by the heads of the various agencies. Thus, in a sense, he is a field secretary for promotion of the program as a whole, as determined by the participating agencies which constitute the State Planning Committee. This seems to us a genuine instance of coordination, since the several agencies are planning and executing their respective shares in the entire program cooperatively, but are not merging at all from the viewpoint of loss of identity and of proper individual functions.

In conclusion, may I reaffirm our frank recognition that the Tennessee program is as yet far less extensive in its working applications than it is comprehensive in its fundamental planning concepts. Nor is it advanced as a panacea pattern for ourselves or for other localities. We do believe, however, that an encouraging beginning has been made in the establishment of certain structural and functional alignments which promise, and in fact are already achieving, unusually cooperative relationships between the forces of health and of education in the common objective of community-wide health education. Toward realization of this goal, we already feel convinced by the experience to date that both forces can contribute far more through coordinated endeavor than can either one alone.

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EDITORIAL DEPARTMENT

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CAUSE OF DIABETES

Fifty years ago von Mehring and Minkowski produced glycosuria in ducks by removing the pancreas, and since that time the pancreas has been designated as the offending organ in diabetes. Since the active principle of the islets of Langerhans was discovered in 1922 and shown to control the blood sugar, studies of the cause of insulin deficiency have become more and more intensive. The failure to identify a constant and characteristic lesion in the pancreas of human diabetics is puzzling, and the marvelous remedy, insulin, still contains some disappointments, since it does not control all the symptoms of diabetes over a period of years. Recent investigations tend to associate the primary etiology of diabetes with a disorder of the anterior pituitary gland. Blood and endocrine changes have been interestingly correlated with each other and with some of the modern work on nutrition.

Houssaye and his associates noted that glycosuria and symptoms of diabetes in animals may be induced by injections of an anterior pituitary extract; and that animals rendered diabetic by removal of the pancreas are benefited if the pituitary gland is also extirpated. Following injection of active anterior pituitary extract into a normal dog, the blood sugar rises. Then the animal becomes resistant and further injections of anterior pituitary extract fail to produce hyperglycemia. The development of resistance to hormone stimulation is a common reaction of normal animals.

Herbert Evans[1] and his associates in California seven years ago reported production of a lasting diabetes in dogs which were being rendered acromegalic with anterior pituitary growth hormone. Subsequent workers have confirmed the production of permanent diabetes after injection of anterior pituitary extracts. In the early work, this result was obtained in only an occasional one of the animals treated.

The mechanism of production of permanent diabetes was studied by Young,[2] of London, who was able to induce the condition in five of six animals treated by repeated daily injections of increasing doses of the same extract. The first injections, according to this author, cause a transient glycosuria. It disappears at the same time that hyperplasia[3] of the islet cells of the pancreas occurs. Young considers that the increase of islet tissue at this time enables the animal to increase its output of insulin and thus to resist subsequent pituitary injections. Repeated and increasing doses are needed to cause permanent diabetes.

Different species of animals vary in their susceptibility to the diabetogenic substance.[4] Guinea pigs do not respond with glycosuria. Rabbits and cats are much less susceptible than dogs. Young reports that he was able to separate the principle which has been called diabetogenic (which was first noted in association with the growth hormone) into two physiologically active materials, one of which causes glycosuria and one polyuria: one a sugar wasting and the other a water wasting hormone. One principle causes hyperglycemia, the other hyperhydremia,

1. Evans, H. M.; Myer, Karl; Simpson, M. E.; and Reichert, F. L.: Disturbances of Carbohydrate Metabolism of Normal Dogs Injected with Hypophyseal Growth Hormone. Proc. Soc. Exper. Biol. & Med., **29**:857. 1932.

2. Young, F. G.: Permanent Experimental Diabetes Produced by Pituitary (Anterior Lobe) Injections. Lancet, **233**:372, 1937.

3. Richardson, K. C.; and Young, F. G.: Histology of Diabetes Induced in Dogs by Injection of Anterior Pituitary Extract. Lancet, **234**:1098 (May 14) 1938.

4. Young, F. G.: Diabetogenic Action of Crude Anterior Pituitary Extract. Biochem. Jour., **32**:513 (March) 1938.

and the latter may be of interest purely from that standpoint.

Dohan and Lukens,[1] of the University of Pennsylvania, have recently confirmed the success of Young's method of producing experimental diabetes. They report that three of eight dogs became permanently diabetic in four to six weeks after a period of daily injections of increasing doses of anterior pituitary extract. Success depends upon administration of larger and larger doses. Biopsies showed that the islet cells of the pancreas of their dogs tended to disappear after the symptoms had persisted for a period. The metabolism of the dogs was like that of partially depancreatized animals, and symptoms were controlled with insulin.

These studies would seem to carry the etiology of diabetes beyond the pancreas and into the pituitary. A still unknown stimulus causes an overproduction of the blood sugar raising hormone of the pituitary, which results in injury to the pancreas. The cause of the anterior pituitary overactivity remains to be learned.

The levels of blood sugar and of blood fat, according to Donelly,[2] are dependent upon the degree of acidity of the body: they rise when the hydrogen ion concentration increases and fall as the body becomes more alkaline. Any mechanism, then, which raises the concentration of acid ions in the body should elevate the blood sugar, with resultant effects on the pancreas or other endocrine organs. A continuously lowered alkalinity of the blood should cause a rise in the sugar level. Merely decreased respiration from a sedentary life, or continuous eating of an acid ash diet, could cause a hyperglycemic diathesis. The mechanism of regulation of blood hydrogen is infinitely complicated.

Diabetes is usually considered a condition of overnutrition, because it develops more frequently in the obese than in the undernourished. Obesity, however, may be considered a disease of malnutrition, due to insufficiency of a necessary food element with resultant abnormal deposition of fat, a deficiency disease less deadly than beriberi.

Cozymase, an enzyme of yeast concerned in the fermentation of sugar, is also found in human blood. Presumably it functions in the utilization of carbohydrate. Cozymase is low in both diabetes and pellagra, according to work of Spies[1] and his associates at the University of Cincinnati. In diabetes, cozymase rises after administration of insulin and adequate diet. In both diabetes and in pellagra, it rises after administration of nicotinic acid. Thus pellagra, a dietary disease of the poor, and diabetes, a dietary disease of the overfed, have this enzyme change in common, and this common response to ingestion of a vitamin. If confirmed, this would suggest a relationship between a vitamin and an internal secretion.

An hypothesis which places diabetes in the class of deficiency diseases is tenable. Whether treatment with any of the known vitamins can benefit it remains to be learned. As evidence against this possibility is the fact that the modern treatment of diabetes for some years has included a high vitamin diet. The recent synthesis of several of the accessory food factors of course provides infinitely more concentrated material than has hitherto been available.

1. Dohan, F. C.; and Lukens, F. D. W.: Persistent Diabetes Following Injection of Anterior Pituitary Extract. Amer. Jour. Physiol., **125**:188 (Jan.) 1939.

2. Donelly, Joseph L.: Concerning the Metabolism of Fat and Carbohydrate. Amer. Jour. Physiol., **124**:126 (Oct.) 1938.

MEDICAL TREATMENT OF PROSTATIC HYPERTROPHY

Since the days of Steinach and Voronoff and earlier, it has been believed that failure of the internal secretions of the ovary and testis is responsible for the onset of old age, and that in these glands may lie the key to rejuvenation and perpetual youth. In the decade since the male and female sex hormones have been standardized and used clinically, men and women have received enough units of these to carry them back to the period of infancy, like Olivoil and Wimpy, but old persons are apparently no less numerous. Perhaps the dosage or preparation has been incorrect.

Though the hormones have shown no potency in the removal of wrinkles or in turning grey hair brown, they are believed, if properly used, to be capable of producing clinical effects. Bolend,[2] in this issue of the JOURNAL, notes a reduction in the size of enlarged human prostate glands, with improvement in the symptoms of

1. Spies, Tom D.: Address, University of Wisconsin, Jan. 10, 1939. Vilter, Vilter and Spies, quoted by Grant, Stone, McLester and Spies: Recent Observations on the Treatment of Six Hundred Pellagrins. Sou. Med. Jour., **31**:1236 (Dec.) 1938.

2. Bolend, Rex. M.: The Use of Testosterone Propionate in Prostatic Hypertrophy. Sou. Med. Jour., this issue, p. 154.

prostatism and in the microscopic picture as shown by biopsy, after treatment with testosterone propionate.

Several chemically different testicular hormone preparations are on the market. Workers[3] at the Lister Institute in London have recently studied the effects of continued injection of three different products on young and senile rats, on their appearance and activity, and on the weights of the various genital tissues, including the prostate; and on the weights of the liver, thymus, and abdominal fat.

Each of the male hormones used caused a decrease in the weight of the testes in both young and old animals. Two preparations, androsterone and dehydroandrosterone, depressed the weight of the secondary sex organs, including the prostate, and one would therefore expect them to be beneficial in rat prostatitis. Testosterone propionate had the reverse effect of stimulating growth of the prostate, which became heavier under treatment with it.

The variability of reaction to hormones of different species of animals is of course well known. Testosterone propionate, the product reported to reduce the size of the human gland,[2] in experimental rats had the opposite effect.

The London investigators note that all preparations used by them caused some decrease in the weight of abdominal fat of the senile rats, which in itself might make this form of medication interesting to men of forty with bay windows.

No preparation used induced any decrease in the appearance of senility of the animals. In a study of control rats, it was apparent that many animals of advanced senile appearance had histologically normal testes, and in view of this fact it was questioned whether these could be the organs responsible for aging. It seemed almost possible to conclude that the secret of perpetual youth does not lie in the gonads. Senility is a more complicated process; and perhaps declining gonadal function depends upon primary degeneration of other tissues, is not the initiator of the senile state.

3. Korenchevsky, V.; and Hall, K.: Prolonged Injection of Male Sex Hormones into Normal and Senile Male Rats. Brit. Med. Jour., No. 4070, p. 4 (Jan. 7) 1939.

GLEANINGS FROM RECENT JOURNALS

Brucellosis in School Children.—An increased interest in the incidence of undulant fever has been apparent for some years. The work of Parsons and Poston,[1] of Duke University, showing the close resemblance of the pathology of brucellosis to that of Hodgkin's disease should stimulate further investigation on the subject. Angle[2] and associates have tested more than seven thousand American school children for the presence of this disease and report positive reactions in 9 per cent. Clinically many of these children had chronic complaints which the authors believed to be due to ambulatory brucellosis. This disease is possibly about to assume the position of public health importance and interest which hookworm held in the South thirty years ago.

Thorium.—Radiopaque thorium dioxide suspensions have been injected into various parts of the body for diagnostic roentgen study for some years. They have been injected into the mammary gland to aid the visualization of tumors, into the blood stream for delineation of the liver, and elsewhere. Because this material is not excreted and has some radioactivity, it is considered dangerous and is usually recommended only for patients who cannot live long.

Jacobson and Rosenbaum,[3] of New York City, examined at autopsy a patient who had received thorium dioxide intravenously for liver examination five years earlier. The liver, even after the lapse of five years, showed considerable radioactivity. Thorium was found in considerable amounts in the spleen, with still more in one of the hepatic lymph nodes. It was believed that this metal was responsible for serious injury to the liver, spleen and lymph nodes.

Circulation in Pregnancy.—The cardiac output in pregnancy rises more than 50 per cent, according to Burwell[4] and associates at Harvard and Vanderbilt. The rise begins around the fifth month of gestation and tends to fall in the tenth

1. Parsons, P. B.; and Poston, M. A.: The Pathology of Human Brucellosis. Sou. Med. Jour., **32**:7 (Jan.) 1939.

2. Angle, F. E.; Algie, W. H.; Baumgartner, L.; and Lunsford, W. F.: Skin Testing for Brucellosis (Undulant Fever) in School Children. Ann. Int. Med., **12**:495 (Oct.) 1938.

3. Jacobson, L. E.; and Rosenbaum, David: Postmortem Findings and Radioactivity Determinations Five Years After Injection of Thorotrast. Radiology, **31**:601 (Nov.) 1938.

4. Burwell, C. Sidney:; Strayhorn, David; Flickinger, D.; Corlette, M. B.; and Bowerman, E. P.: Circulation During Pregnancy. Arch. Int. Med., **62**:979 (Dec.) 1938.

month. There is a rise of nearly 50 per cent in blood volume, and a tendency to elevated pulse pressure, due probably to the fact that the diastolic pressure falls more than the systolic. The oxygen consumption rises steadily as the fetus increases in size.

With such a rise in blood volume, and increase in the effort of the heart to move it, it cannot but be a drain on the tissues to keep the many constituents of the blood at their normal level.

TWENTY-FIVE YEARS AGO

From Journals of 1914

Price of a Place in a Medical Directory.[1]—There are two general medical directories published in the United States. * * * Both are large volumes and seem to contain the names and addresses of all the doctors, omitting none. But there is a radical difference between the two directories, and to this difference the JOURNAL invites the attention of its readers. * * * A glance at one directory shows great discrimination in the presentation of the claims of different physicians to the confidence of the people. * * * the majority of the names appear in obscure, small type, and occupy as little space as will express the name and address of the doctor. At the same time other physicians will be represented by much larger type spread over a liberal amount of space, and recounting the honors, positions and societies, and any other element of glory that the man in question sees fit to supply. Anyone claiming to be a doctor, though the most blatant advertising quack, without reference to his character or ability, and no matter what his "race, color or previous condition of servitude," can have this so-called extended information inserted for a specified sum called the price of the directory. The next doctor above or below him in the book may be a famous surgeon or a celebrated internist, yet unless he has surrendered to the hold-up and paid the price, his name will appear trifling and insignificant. * * *

The publishers of the other directory also gather in all possible information directly from the persons interested, but * * * they institute an investigation, regardless of expense, in order to insure the absolute accuracy of every statement that appears in their directory. * * * If you need a directory, purchase the one that does not place the advertising quack on a plane of equality with yourself.

Those who have seen the great directory published by the American Medical Association will easily guess that it is the one referred to when a comprehensive and reliable medical directory is mentioned. Indeed, it is the only medical directory worthy to be seen in an ethical physician's office.

1. Editorial. Sou. Med. Jour., 7:162, 1914.

Gorgas.[2]—The daily press announces with entire approval the promotion of Col. W. C. Gorgas to the position of Surgeon-General of the United States Army, with the rank of Brigadier-General.

Radium.[3]—Dr. Howard A. Kelly wants some one with $1,000,000 or more and philanthropic impulse to endow a radium institute for the treatment of cancer.

Advertisement, Professional Clothing.[4]—We specialize in tailoring to professional men. * * * To the first physician in any town who sends us his order for one of our made-to-measure all-wool black or blue suits at $15, such a suit as you would pay $25 for elsewhere, we will give a regular $4.00 satin lining free. Barnard Hewitt & Co., Chicago.

Advertisement, An Indestructible Light Buggy.[5]—The genuine hammock cart vs. the buggy. Costs one-half less to buy * * * known to run 20 years * * * no weight on horse's back * * * vehicle for hard service. Pays for itself in saving of horse flesh and horse feed. The Eureka Co., Rock Falls, Ill.*

2. Ibid., p. 163.
3. Southern Medical News, Maryland. Ibid., p. 20.
4. Ibid., p. xxi.
5. Ibid., p. xxi.

*How many doctors in America still use buggies in their practice? Will you list any that you know?

Book Reviews

Practical Microbiology and Public Health: For Students of Medicine, Public Health and General Bacteriology. By William Barnard Sharp, S.M., M.D., Ph.D., Professor of Bacteriology and Preventive Medicine in the Medical Department of the University of Texas; Visiting Bacteriologist of John Sealy Hospital, Galveston; Supervisory Bacteriologist of Galveston Health Department. 492 pages, illustrated. St. Louis: The C. V. Mosby Company, 1938. Cloth $4.50.

This is a laboratory manual written to supplement a lecture course in a public health. It contains some of the aspects of a textbook, as it gives a great deal of information and is well bound. A number of exercises in bacteriology are given as well as field exercises and laboratory procedures. Space is provided so that results obtained by the practical work may be recorded in the book. This text systematizes the instruction in public health and enables the student to correlate laboratory and field work with the lectures.

Malaria in The Netherlands. By N. H. Swellengrebel and A. de Buck. 269 pages, illustrated. Amsterdam: Sheltema & Holkema, Ltd., 1938.

A book which gives in detail the problem of malaria and malaria control in The Netherlands. The authors discuss the types of mosquitoes, where they are found

BOOK REVIEWS continued on page 231

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Section on Allergy—Dr. Charles H. Eyermann, Chairman, St. Louis, Missouri; Dr. Homer E. Prince, Vice-Chairman, Houston, Texas; Dr. E. Rankin Denny, Secretary, Tulsa, Oklahoma.

Section on Surgery—Dr. Robert M. Howard, Chairman, Oklahoma City, Oklahoma; Dr. H. A. Gamble, Vice-Chairman, Greenville, Mississippi; Dr. J. M. T. Finney, Jr., Secretary, Baltimore, Maryland.

Section on Bone and Joint Surgery—Dr. Earl D. McBride, Chairman, Oklahoma City, Oklahoma; Dr. J. Hiram Kite, Vice-Chairman, Atlanta, Georgia; Dr. Guy W. Leadbetter, Secretary, Washington, D. C.

Section on Gynecology—Dr. E. W. Bertner, Chairman, Houston, Texas; Dr. John F. Lucas, Vice-Chairman, Greenwood, Mississippi; Dr. W. O. Johnson, Secretary, Louisville, Kentucky.

Section on Obstetrics—Dr. Milton Smith Lewis, Chairman, Nashville, Tennessee; Dr. R. M. Anderson, Vice-Chairman, Shawnee, Oklahoma; Dr. Joseph W. Reddoch, Secretary, New Orleans, Louisiana.

Section on Urology—Dr. William N. Coppridge, Chairman, Durham, North Carolina; Dr. Henry S. Browne, Vice-Chairman, Tulsa, Oklahoma; Dr. Grayson Carroll, Secretary, St. Louis, Missouri.

Section on Proctology—Dr. Curtice Rosser, Chairman, Dallas, Texas; Dr. John L. Jelks, Vice-Chairman, Memphis, Tennessee; Dr. Fredk. Bennett Campbell, Secretary, Kansas City, Missouri.

Section on Railway Surgery—Dr. James W. Davis, Chairman, Statesville, North Carolina; Dr. Edgar F. Fincher, Secretary, Atlanta, Georgia.

Section on Ophthalmology and Otolaryngology—Dr. Lawrence T. Post, Chairman, St. Louis, Missouri; Dr. Harvey B. Searcy, Chairman-Elect, Tuscaloosa, Alabama; Dr. C. C. Cody, Vice-Chairman, Houston, Texas; Dr. L. Chester McHenry, Secretary, Oklahoma City, Oklahoma.

Section on Anesthesia—Dr. Carl W. Hoeflich, Chairman, Houston, Texas; Dr. J. D. McCulley, Vice-Chairman, Houston, Texas; Dr. Merrill C. Beck, Secretary, New Orleans, Louisiana.

Section on Medical Education and Hospital Training—Dr. M. Pinson Neal, Chairman, Columbia, Missouri; Dr. Robert U. Patterson, Vice-Chairman, Oklahoma City, Oklahoma; Dr. Harvey B. Haag, Secretary, Richmond, Virginia.

Section on Public Health—Dr. G. Foard McGinnes, Chairman, Richmond, Virginia; Dr. Charles M. Pearce, Vice-Chairman, Oklahoma City, Oklahoma; Dr. Henry C. Ricks, Secretary, Jackson, Mississippi.

American Public Health Association, Southern Branch (meeting conjointly with Southern Medical Association)—Dr. J. N. Baker, President, Montgomery, Alabama; Dr. W. B. Grayson, First Vice-President, Little Rock, Arkansas; Mr. V. M. Ehlers, Second Vice-President, Austin, Texas; Miss Donna Pearce, Third Vice-President, New Orleans, Louisiana; Dr. P. E. Blackerby, Secretary-Treasurer, Louisville, Kentucky.

National Malaria Committee (meeting conjointly with Southern Medical Association)—Dr. L. O. Howard, Honorary Chairman, Washington, D. C.; Mr. L. M. Clarkson, Chairman, Atlanta, Georgia; Mr. W. G. Stromquist, Chairman-Elect, Chattanooga, Tennessee; Dr. L. T. Coggeshall, Vice-Chairman, New York, New York; Dr. Mark F. Boyd, Secretary-Treasurer, Tallahassee, Florida.

American Society of Tropical Medicine (meeting conjointly with Southern Medical Association)—Dr. Alfred C. Reed, President, San Francisco, California; Dr. L. L. Williams, Jr., President-Elect, Washington, D. C.; Dr. S. S. Cook, Vice-President, Norfolk, Virginia; Dr. E. Harold Hinman, Secretary-Treasurer, Wilson Dam, Alabama; Dr. Charles F. Craig, Editor, San Antonio, Texas.

Southern Association of Anesthetists (meeting conjointly with Southern Medical Association)—Dr. R. F. Bonham, President, Houston, Texas; Dr. T. L. Tidmore, President-Elect, Atlanta, Georgia; Dr. R. D. Sanders, Vice-President, Louisville, Kentucky; Dr. Dougal M. Dollar, Secretary-Treasurer, Louisville, Kentucky.

Women Physicians of the Southern Medical Association—Dr. Margaret Mary Nicholson, Chairman, Washington, D. C.; Dr. Leila E. Andrews, Vice-Chairman, Oklahoma City, Oklahoma; Dr. Nina Fay Calhoun, Secretary, Dallas, Texas.

Woman's Auxiliary to the Southern Medical Association—Mrs. W. K. West, President, Oklahoma City, Oklahoma; Mrs. Charles P. Corn, President-Elect, Greenville, South Carolina; Mrs. Lewis J. Moorman, First Vice-President, Oklahoma City, Oklahoma; Mrs. Olin S. Cofer, Second Vice-President, Atlanta, Georgia; Miss Grace Stroud, Recording Secretary, Louisville, Kentucky; Mrs. Allen G. Gibbes, Corresponding Secretary, Oklahoma City, Oklahoma; Mrs. K. W. Cosgrove, Treasurer, Little Rock, Arkansas; Mrs. W. W. Crawford, Historian, Hattiesburg, Mississippi; Mrs. Gordon Ira, Parliamentarian, Jacksonville, Florida.

Book Reviews

Continued from page 229

and what measures they took to control them and the cost of these methods. They found that the short wing mosquito is responsible for the malaria and that it breeds in salt marshes. The spraying of houses was effective, but did not take care of the "healthy" carrier and was very troublesome. They believe that a permanent cure would be accomplished by freshening the salt marshes. An important contribution to our knowledge of malarial control.

The Practice of Medicine. By Jonathan Campbell Meakins, M.D., LL.D., Professor of Medicine and Director of the Department of Medicine, McGill University. Second Edition. 1413 pages, illustrated. St. Louis: The C. V. Mosby Company, 1938. Cloth $12.50.

In this edition appendicitis has been inserted, and diseases of intestinal absorption have been made into a new section. Other portions added or rewritten and enlarged are: acute laryngotracheobronchitis; tuberculous tracheitis; "cysts" of the lung; Friedlander pneumonia; lipoid pneumonia; monocytic leukemia; nutritional edema; protamine zinc insulin; experimental nephritis; vascular renal failure; congenital aplasia of the kidney; uremic state; sulfanilamide therapy; lymphogranuloma inguinale; epidemic pleurodynia; and cannabis indica intoxication.

A number of the illustrations have been replaced and several new ones have been added.

This is a book that the student will find very useful and to which the practitioner can turn for reference.

Experience in the Management of Fractures and Dislocations (Based on An Analysis of 4,390 Cases). By the Staff of the Fracture Service, Massachusetts General Hospital, Boston. Under the General Editorship of Philip D. Wilson, M.D., Surgeon-in-Chief, Hospital for Ruptured and Crippled, New York, New York; Clinical Professor of Orthopedic Surgery, College of Physicians and Surgeons, Columbia University; Formerly Associate Chief, Fracture Service, Massachusetts General Hospital. 1036 pages, illustrated. Philadelphia: J. B. Lippincott Company, 1938. Cloth $15.00.

The editor, Dr. Philip D. Wilson, has in this text included the experience of the Fracture Service of the Massachusetts General Hospital during the years 1923 to 1930. Each one of the staff has become particularly interested and competent in a specific fracture or region and subsequently assigned to its special consideration; each has presented his material here.

The result is unique, and a great addition to the literature. Standard texts can dwell only on generalities, and often specific problems are not answered. The volume contains 1,036 pages and 1,119 illustrations, presents observations upon 3,985 patients and 4,390 fractures and dislocations. Tracings of the x-rays, or schematic drawings, are presented.

The material differs from that of other treatises, in that it is based upon the actual study of cases and analysis of results of treatment. Among this group of cases the physician with a specific problem on his hands should be able to find one or more similar cases, and thus profit by the experience of the authors.

The volume ably fills a large gap that has existed for years, and the authors are to be commended on the results. Dr. Wilson is to be commended on his scientific viewpoint as exemplified by his statement: "We are neither proud of our results nor ashamed of them, but present them for what they are worth as a matter of actual experience. Let anyone who wishes to criticize or claim better results present his actual consecutive experience with results as critically appraised as these and we shall be glad to profit from the comparison."

Interns' Handbook: A Guide, Especially in Emergencies, for the Intern and the Physician in General Practice. By Members of the Faculty of the College of Medicine, Syracuse University, Under the Direction of M. S. Dooley, A.B., M.D., Chairman Publication Committee. Second Edition. 532 pages, illustrated. Philadelphia: J. B. Lippincott Company, 1938. Cloth $3.00.

The intern faced with a problem can slip this handbook out of his pocket and in it find a guide to its intelligent handling. New sections on allergy, anesthesia, chest conditions, circulatory disturbances, coma, dehydration, food poisoning, fractures, head injuries, intern relations, medical jurisprudence, newer drugs in resuscitation, pregnancy test, sex hormones, shock, intravenous solutions and vitamins have been added. While most of these additions are probably worth while, the student should be given some credit for a little knowledge, and the authors should be careful or the book will become too bulky for its purpose.

Clinical Laboratory Methods and Diagnosis: A Textbook on Laboratory Procedures with Their Interpretation. By R. B. H. Gradwohl, M.D., Director of the Gradwohl Laboratories and Gradwohl School of Laboratory Technic. Second Edition. 1607 pages, illustrated. St. Louis: The C. V. Mosby Company, 1938. Cloth, $12.50.

This book has been greatly expanded since its first appearance three years ago. Not only have the clinical laboratory procedures been simplified where possible, but many have been replaced by more modern methods which have become standard. The chapter on hematology has received extensive treatment; over one hundred new pages and twenty-four full-page color plates have been added. A new chapter is "Detection of Crime by Laboratory Methods." Dr. Gradwohl has given this the same exhaustive treatment as he gave to the remainder of the book, and it is based on actual experience as is the rest of the book. This book is an excellent source of information, as it embraces the whole of clinical pathology.

Doctor Bradley Remembers. By Francis Brett Young. 522 pages. New York: Reynal & Hitchcock, 1938. Cloth $2.75.

For the last few years there has occurred in the field of letters an epidemic which for the want of a better term, might be called "Doctors on Parade." There have been presented to the public many phases of the physician's life. His standards, his virtues and his vices

have been questioned, analyzed and found to be right or wrong according to the slant of the particular author. This preoccupation of letters with the medical profession has not been without value. Usually the physician has been given sympathetically to the public first and foremost as a human being. Sometimes he has been shown as having caught the vision of service, sometimes as having fallen short, but on the whole this physician of recent literature has been in the thick of living, active and dynamic, so to speak, while drama, action and life itself have been his background. The dull and drab moments have been overshadowed by the brightness of accomplishments.

This is not the case with this latest book, "Dr. Bradley Remembers," which contains little of interest and much personal bias.

Diseases of the Nose, Throat and Ear. By W. Wallace Morrison, M.D., Clinical Professor and Chief of Clinic, Department of Otolaryngology, New York Polyclinic Medical School and Hospital. 675 pages, illustrated. Philadelphia: W. B. Saunders Company, 1938.

This is a well written, fully illustrated volume of some six hundred pages and contains far more than can possibly be learned by the student or practitioner for whom it was written. The diagrams are sometimes so elaborate as to be confusing. The inclusion of many prescriptions will appeal to a certain number of students. An excellent index adds greatly to the ease of reference to the volume. There are no colored plates. The book is valuable for review even by the experienced specialist and the author's extensive experience has enabled him to suggest many useful measures rarely utilized by others. It is a useful book.

Martini's Principles and Practice of Physical Diagnosis. Edited by Robert F. Loeb, M.D., Professor of Medicine, College of Physicians and Surgeons, Columbia University and Presbyterian Hospital, New York, New York. From the Authorized Translation by George J. Farber, M.D., Assistant in Roentgenology, Johns Hopkins University School of Medicine. Second Edition. 213 pages, illustrated. Philadelphia: J. B. Lippincott Company, 1938. Cloth $2.00.

The changes in this text are not of great enough importance to warrant the replacement of the first edition. The chapters on the respiratory and circulatory systems have been clarified and added emphasis is given to the abnormalities of the venous pressure. The paper is of better grade. For the man who wishes a brief, well written book on physical diagnosis, this one will fill the need.

Dr. Colwell's Daily Log for Physicians. 1939. A Brief, Simple, Accurate Financial Record for the Physician's Desk. Champaign, Illinois: Colwell Publishing Company, 1938.

The Daily Log is more than a simplified bookkeeping system. At the end of the daily record sheets there is a summary sheet for business and expense records that covers every item in the office. Following this is a valuable narcotic, social security tax and utility record. At the back of the Log there are blanks which will afford an obstetrical record, complete in every detail.

The Daily Log for the physician's office is comparable to the slide rule for the engineer.

Southern Medical News

ALABAMA

Dr. Martle F. Parker, Greenville, has been named Health Officer of Butler County to succeed Dr. Charles J. Fisher, who is taking graduate work at the Johns Hopkins School of Hygiene and Public Health, Baltimore.

Dr. Hugh G. Clark, Lafayette, has been appointed Health Officer of Chambers County to succeed Dr. Abraham I. Perley, who has been awarded a year's graduate study at Harvard.

Dr. J. Donald Smith, Tuscaloosa, announces his association with Dr. John M. Forney, with offices in the First National Bank Building.

Dr. Irl R. Long, St. Louis, has been appointed University Physician to succeed Dr. Elliott O. Ursin, who has resigned to take a position at Fort McPherson, Georgia.

Dr. J. H. Goode, Tuscaloosa, announces the removal of his offices to 1424 University Avenue.

Deaths

Dr. Theodore C. Baumhauer, Uriah, aged 58, died October 9 of coronary thrombosis.

Dr. Noah Alexander Johnston, Adamsville, aged 62, died October 13.

ARKANSAS

The Sevier County Medical Society has elected the following officers for the coming year: Dr. G. L. Kimball, DeQueen, President; Dr. C. A. Archer, DeQueen, Vice-President; Dr. J. S. Hendricks, DeQueen, Secretary-Treasurer.

The Searcy County Medical Society has elected the following officers for the coming year: Dr. E. W. Wood, Marshall, President; Dr. J. O. Leslie, Marshall, Vice-President; Dr. S. G. Daniel, Marshall, Secretary-Treasurer.

The Woodruff County Medical Society has elected the following officers for the coming year: Dr. W. T. Wilkins, Cotton Plant, President; Dr. J. H. West, McCrory, Vice-President; Dr. L. E. Biles, Augusta, Secretary-Treasurer.

The Cleveland County Medical Society has elected the following officers for the coming year: Dr. T. L. Adams, Rison, President; Dr. A. B. Robertson, Rison, Vice-President; Dr. W. G. Hancock, Rison, Secretary-Treasurer.

The Lonoke County Medical Society has elected the following officers for the coming year: Dr. F. A. Corn, Lonoke, President; Dr. S. S. Beaty, England, Vice-President; Dr. O. D. Ward, England, Secretary-Treasurer.

Dr. Ralph M. Sloan, Jonesboro, has been elected a Director of the Jonesboro Chamber of Commerce.

Dr. Ralph A. Law, Little Rock, has been elected a Director of the Christ Church Men's Club.

Dr. O. L. Atkins, formerly of Cotter, has moved to Hampton.

Dr. Robert Caldwell, Little Rock, has been elected a member of the Little Rock School Board.

Dr. R. J. Turner, Fayetteville, has been appointed City Health Officer.

Dr. F. G. Engler, formerly of Mountainburg, is now located at Alma.

Dr. M. E. Blanton, Jonesboro, has been elected a Director of the Jonesboro Young Business Men's Club.

Dr. J. P. Price, Jr., Monticello, and Miss Corinne Beasley, Waldo, were married December 26.

Deaths

Dr. John T. McMath, Strong, aged 58, died recently of carcinoma of the lung.

Dr. Ralph William Steele, Fayetteville, aged 48, died recently of nephritis.

Dr. C. J. Curry, Benton, aged 78, died in September.

Dr. J. E. Sutton, Viola, aged 69, died September 21 of myocarditis.

Dr. Andrew S. Gregg, Fayetteville, aged 81, died November 21.

Dr. Amos W. Troupe, Pine Bluff, aged 82, died November 21 from injuries received in an automobile accident.

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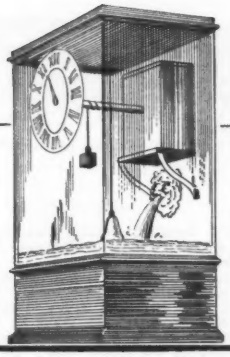

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Ancient but accurate Grecian timepiece which operated on the principle of "*Water Balance*"

"Water Balance" in Constipation Control

The water content of the bowel determines normalcy. Thus:

Excess H_2O—is present in diarrhea
Deficient H_2O—is present in constipation

Mucilose, by influencing "water balance," brings about a more normal condition in the fecal content.

Therefore, prescribe Mucilose to help restore normal bowel function and so relieve the alternating symptoms of constipation and diarrhea often associated with spastic colitis.

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offers a hemicellulose (vegetable gum) prepared by a special process from the Plantago loeflingii. It affords symptomatic relief in colitis and constipation by holding water in the feces, and thus increasing responsiveness of the physiologic mechanism of peristalsis.

Mucilose is available in two convenient, palatable forms—**Mucilose Granules** and **Mucilose Flakes.**

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The following types of POSTGRADUATE instruction in all branches of medicine are offered to graduate physicians:

(a) Courses leading to advanced degrees.

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(Either of the above courses is adaptable towards satisfying certain requirements of the various specialty boards.)

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(Two six weeks' courses offered each session. The first begins early January and the second mid-February.)

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For detailed information write (stating type of course wanted) to

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Harvard Medical School

Courses for Graduates

General Course in
ORTHOPAEDIC SURGERY

April 3-29, inclusive

By Dr. Frank R. Ober and Associates at the Children's and Massachusetts General Hospitals and Harvard Medical School.

The course will consist of clinical and didactic work supplemented by instruction in operative orthopaedic surgery on the cadaver.

Fee, $150

General Course in
INTERNAL MEDICINE

April and May at the Boston City Hospital; June at the Peter Bent Brigham Hospital; July at the Massachusetts General Hospital; repeated in the same order beginning August 1st.

The course is arranged for practicing physicians who can give from one to two months to a comprehensive review of internal medicine.

Fee, $150 per month

Apply to Assistant Dean, Courses for Graduates, Harvard Medical School,
Boston, Massachusetts

Continued from page 232

Dr. William A. Purifoy, Chidester, aged 70, died November 25.

Dr. Octavius Lamar Williamson, Marianna, aged 61, died November 26 of coronary disease.

Dr. Carl G. Davis, Hot Springs National Park, aged 52, died December 3.

Dr. Ephraim Graeme McCormick, Prairie Grove, aged 83, died December 12.

DISTRICT OF COLUMBIA

The Annual Midwinter Conference of Eastern Radiologists will be held in Washington February 10 and 11 at the Hotel Mayflower.

The Washington Medical and Surgical Society has elected the following officers for the coming year: Dr. Robert Oden, President; Dr. Beveridge Miller, Vice-President; Dr. H. J. Russell McNitt, Secretary; Dr. Frank E. Gibson, Permanent Treasurer.

The George M. Kober Medical Society has elected the following officers for the coming year: Dr. Don Johnson, President; Dr. William M. Ballinger, Vice-President; Dr. H. J. Russell, McNitt, Secretary; Dr. Don S. Knowlton, Treasurer.

Dr. William J. Mallory was elected President of the Washington Social Hygiene Society recently to fill the unexpired term of the late Dr. Earl Baldwin McKinley.

Dr. Riley H. Guthrie, formerly of Boston, has been appointed First Assistant Physician of St. Elizabeths Hospital.

Dr. G. J. P. Barger was elected to the Board of Directors of the Academy of Physical Medicine at its recent annual meeting.

DEATHS

Dr. William Kennedy Butler, Washington, aged 81, died October 17.

Dr. Kate E. Lozier, Washington, aged 84, died October 24 of bronchitis and pneumonia.

Dr. John William Chappell, Washington, aged 82, died November 2 of chronic myocarditis.

Dr. Elmer Ellsworth Jackson, Washington, aged 77, died recently of intestinal obstruction.

FLORIDA

Dr. Edward Jelks, Jacksonville, was elected Chairman of the Technical Advisory Committee to the Florida Crippled Children's Commission at a meeting in Jacksonville December 1.

Dr. Leo C. Gonzalez, Jacksonville, has been appointed Director of the newly created Venereal Disease Control Division of the Florida State Board of Health.

Dr. Lucien Y. Dyrenforth, Jacksonville, was recently made Chairman of the Committee on the Biologic Sciences of the Florida Academy of Sciences.

Dr. M. W. Spearman, Lake City, announces the removal of his office to the corner of Columbia and DeSoto Streets.

The Lake County Medical Center at Eustis, owned and operated by members of the Lake County Medical Society, was formally opened on November 6.

Dr. Paul H. Martin, Jacksonville, announces his association with Dr. F. L. Fort and Dr. J. F. Lovejoy with offices in the Medical Arts Building.

Dr. M. B. Marks, of Miami Beach, was the delegate from the University of Illinois College of Medicine at the installation of the University of Florida Chapter of the honorary scientific society of Sigma Xi at Gainesville recently.

The Florida Society of Dermatology and Syphilology has elected the following officers for the coming year: Dr. Elmo D. French, Miami, President; Dr. Lauren M. Sompayrac, Jacksonville, was reelected Secretary. The next meeting of the Society will be held in Tampa in the spring.

Dr. Marion B. O'Kelley, Leesburg, and Miss Barbara Davis Hoffman, Washington, D. C., were married on November 4.

Dr. Gustave Neri Click, Pensacola, and Miss Adelaide Woodhouse West, Norfolk, Virginia, were married recently.

DEATHS

Dr. Thomas M. Edwards, Frostproof, aged 64, died November 3 of cerebral hemorrhage.

GEORGIA

Dr. Samuel F. Rosen, Savannah, has been elected to membership in the American Academy of Dermatology.

Continued on page 36

Roche-Organon, Inc.

ANNOUNCES

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AS MUCH AS TWENTY-FIVE PERCENT ON

NEO-HOMBREOL

(synthetic testosterone propionate 'Roche-Organon')

Male Sex Hormone

AND THIRTY-THREE AND A THIRD PERCENT ON

PROGESTIN

(synthetic progesterone 'Roche-Organon')

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These reductions are made possible by greatly increased production and manufacturing economies effected by the untiring initiative of our chemists. As new and improved manufacturing processes are developed, we will continue to pass on any resulting savings.

NEO-HOMBREOL *for Male Climacteric • Prostatic Hypertrophy • Impotence • Mastopathia in the Female •* PROGESTIN *for Habitual or Threatened Abortion • Excessive Periodic Hemorrhage • Spasmodic Dysmenorrhea • Pre-eclamptic Toxemia of Pregnancy*

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An eight months' course in Otolaryngology for those beginning the study of diseases of the ear, nose and throat.

Only graduates of medical schools who have completed a year of intern service will be admitted to the course.

The course begins September 25, 1939. Fee for the course is $600.00.

For further information apply to

The Registrar
WASHINGTON UNIVERSITY
SCHOOL OF MEDICINE
St. Louis, Missouri

Continued from page 34

Dr. George Bachmann, Emory University, has been elected to membership in the New York Academy of Science.

Dr. H. L. Erwin and Dr. Trammell Starr, both of Dalton, recently attended surgery clinics in New Orleans.

Dr. T. S. Clay, Savannah, has recently been appointed Assistant Surgeon General of the Georgia Division of the United Confederate Veterans.

Dr. Arthur Rowell Dahlgren, Atlanta, and Miss Jane Hartzog, Los Angeles, California, were married recently.

Dr. William R. Baker and Miss Mary Corine Jaillet, both of Atlanta, were married in September.

Deaths

Dr. William B. Marks, Augusta, aged 76, died recently of hypertension and coronary occlusion.

Dr. B. B. Roberts, Atlanta, aged 42, died January 5.

Dr. John H. O'Quinn, Patterson, aged 69, died October 30 of hemiplegia, myocarditis and hypostatic pneumonia.

Dr. Harris M. Branham, Brunswick, aged 76, died October 28 of cerebral hemorrhage and chronic myocarditis.

Dr. Jesse Moody Oliver, Hazlehurst, aged 51, died October 18 of acute biliary cirrhosis of the liver.

Dr. William Marion Bryant, Albany, aged 64, died October 11.

Dr. Benjamin Kelly Simmons, Blakely, aged 68, died recently.

Dr. Arthur Churchill Shamblin, Cartersville, aged 67, died recently.

KENTUCKY

The Whitley County Medical Society has elected the following officers for the coming year: Dr. O. L. Richmond, Corbin, President; Dr. L. S. Siler, Corbin, Vice-President; Dr. C. A. Moss, Williamsburg, Secretary-Treasurer.

The Scott County Medical Society has elected the following officers for the coming year: Dr. A. F. Smith, Georgetown, President; Dr. R. C. Lake, Georgetown, Vice-President; Dr. Carl M. Gambill, Georgetown, Secretary-Treasurer.

Continued on page 38

THE NEW YORK POLYCLINIC
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Urologic Operations	Dermatology and Syphilology
Diagnosis and Office Treatment	Diathermy
Regional Anesthesia	Pathology
Proctology	Roentgenology
Neurology	

Operative Urology (cadaver)

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A full time course. In Obstetrics: Lectures; prenatal clinics; witnessing normal and operative deliveries; operative obstetrics (manikin). In Gynecology: Lectures; touch clinics; witnessing operations; examination of patients pre-operatively; follow-up in wards post-operatively. Obstetrical and Gynecological pathology; regional anesthesia (cadaver). Attendance at conferences in Obstetrics and Gynecology. Operative Gynecology on the Cadaver.

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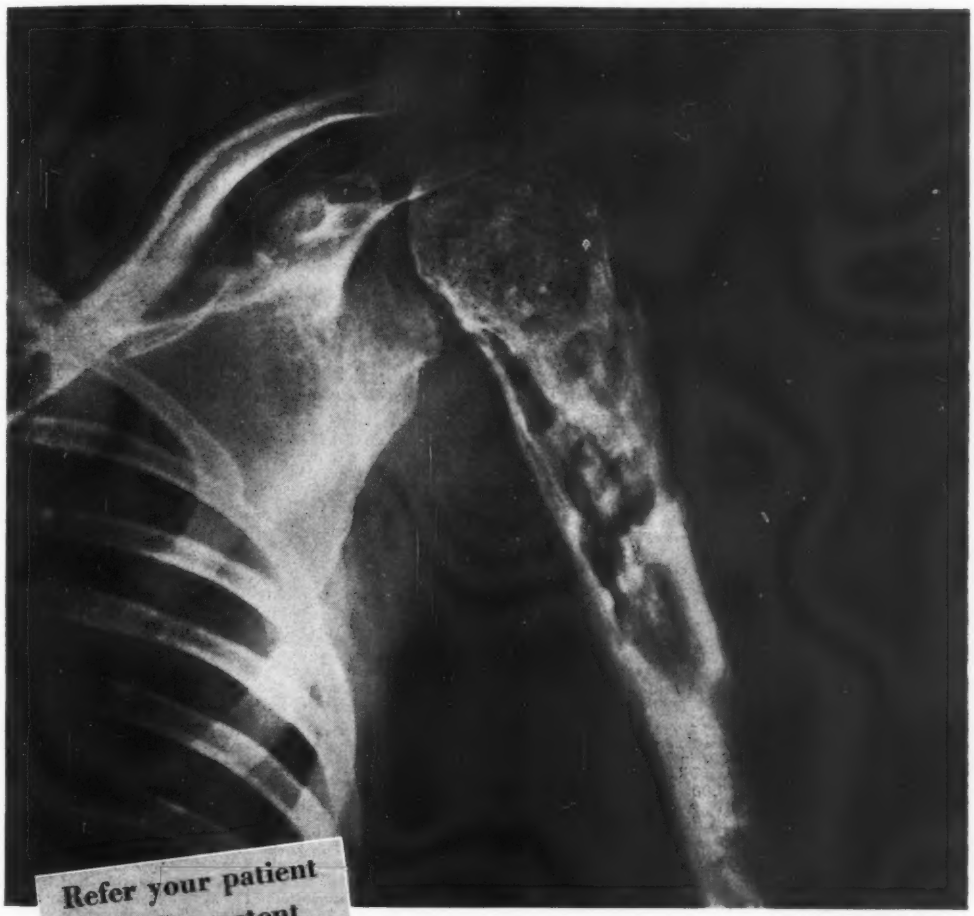

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EASTMAN KODAK COMPANY *Medical Division* Rochester, N. Y.

Continued frob page 36

The Jefferson County Medical Society has elected the following officers for the coming year: Dr. E. Lee Heflin, Louisville, President; Dr. M. J. Henry, Louisville, First Vice-President; Dr. Arthur T. Hurst, Louisville, Second Vice-President; Dr. Jesshill Love, Louisville, Treasurer; Dr. W. B. Troutman, Louisville, Secretary.

Dr. Irvin Abell, Louisville, recently received the Laetare Medal, awarded annually by the University of Notre Dame to an outstanding Catholic layman.

Intensive Post-Graduate Course in Ophthalmology

The George Washington University School of Medicine

Washington, D. C.

For Graduates in Medicine: April 10th-15th, 1939, inclusive

GUEST LECTURERS

Drs. Francis Heed Adler, S. Judd Beach, Wm. L. Benedict, Wm. H. Crisp, E. C. Ellett, Everett L. Goar, Parker Heath, John Green, Allen Greenwood, P. Chalmers Jameson, Walter B. Lancaster, S. Hanford McKee, C. S. O'Brien, Luther C. Peter, A. D. Ruedemann, Georgiana D. Theobald, F. Bruce Fralik.

RESIDENT MEMBERS

Drs. Wm. Thornwall Davis, Ernest Sheppard, G. Victor Simpson, E. Leonard Goodman, Ronald A. Cox, Frank D. Costenbader, Horace E. Allen, Sterling Bockoven, George B. Jenkins, Lt.-Col. J. E. Ash, M.C., U.S.A., Capt. Elbert DeCoursey, M.C., U.S.A.

Fee $40.00

Special Practical 5-day course limited to 25 participants. April 4-8th, 1939, inclusive, on SURGERY, PATHOLOGY and ORTHOPTICS.

Fee $60.00

Interviews by several members of the American Board of Ophthalmology regarding examinations before this Board will be given to those registered for the course.

For further details apply to the secretary, Miss Louisa G. Wells, 927 17th Street, N. W., Washington, D. C.

Dr. Alfred Deaderick Doak, Shelbyville, and Miss Evelyn Marie Cowan, Fayetteville, Tennessee, were married recently.

DEATHS

Dr. Stonewall Jackson Smock, LaGrange, aged 72, died October 1 of carcinoma.

Dr. Thomas C. Nichols, Falmouth, aged 89, died recently of diabetes mellitus and myocarditis.

Dr. John B. Wadlington, Princeton, aged 62, died recently of pneumonia and heart disease.

Dr. N. R. Fitch, Bowling Green, died November 30.

Dr. J. C. Dodson, Richelieu, died November 1.

Dr. R. N. Williams, Sanders, aged 77, died recently of a heart attack.

LOUISIANA

The New Orleans Parish Medical Society has elected the following officers for the coming year: Dr. Cassius L. Peacock, New Orleans, President; Dr. Edmund L. Leckert, New Orleans, First Vice-President; Dr. Lucien A. Fortier, New Orleans, Second Vice-President; Dr. Andrew V. Friedrichs, New Orleans, Third Vice-President; Dr. Gilbert C. Anderson, New Orleans, Secretary; Dr. Edwin H. Lawson, New Orleans, Treasurer.

The New Orleans Eye, Ear, Nose and Throat Society gave a dinner in honor of Dr. Otto Joachim, November 11, to commemorate his seventy-fifth birthday and his fiftieth anniversary in the practice of medicine in New Orleans.

Dr. John T. O'Ferrall, New Orleans, was appointed a member of the Orthopedic Council of the National Foundation for Infantile Paralysis for the celebration of the President's birthday.

Dr. George Hauser, New Orleans, has been made City Bacteriologist, succeeding the late Dr. William H. Seemann.

Dr. George F. Roeling, New Orleans, has been appointed Superintendent of the City Hospital for Mental Diseases.

Dr. Ansel M. Caine, New Orleans, has been elected a member of the Board of Directors of the American Society of Anesthetists.

Dr. William Harvey Perkins, New Orleans, has recently been made President of the Tuberculosis and Public Health Association of Louisiana.

The New Orleans Urological Society has elected the following officers: Dr. Monroe Wolf, Chairman; Dr. Hugh T. Beacham, Vice-Chairman; Dr. James S. Davidson, Secretary-Treasurer.

The Bi-Parish Medical Society has elected the following officers for the coming year: Dr. T. H. Pargen, Jackson, President; Dr. A. D. Long, Jackson, Vice-President; Dr. E. M. Toler, Clinton, Secretary-Treasurer.

The East Baton Rouge Parish Medical Society has elected the following officers for the coming year: Dr. U. S. Hargrove, Baton Rouge, President; Dr. J. T. Lewis, Baton Rouge, Vice-President; Dr. Cecil Lorio, Baton Rouge, Secretary-Treasurer.

The Pointe Coupee Parish Medical Society has elected the following officers for the coming year: Dr. J. W. Plauche, Morganza, President; Dr. J. M. Mosely, Lakeland, Vice-President; Dr. E. G. Durel, New Roads, Secretary-Treasurer.

The Sabine Parish Medical Society has elected the following officers for the coming year: Dr. H. M. Prothro, Pleasant Hill, President; Dr. S. F. Fraser, Many, Vice-President; Dr. O. L. Sanders, Converse, Secretary-Treasurer.

Continued on page 40

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Continued from page 38

The Rapides Parish Medical Society has elected the following officers for the coming year: Dr. J. T. Cappel, Alexandria, President; Dr. N. T. Simmonds, Alexandria, First Vice-President; Dr. J. L. Woodall, Colfax, Second Vice-President; Dr. J. A. White, Jr., Alexandria, Secretary-Treasurer.

The Red River Parish Medical Society has elected the following officers for the coming year: Dr. W. E. Wilkinson, Coushatta, President; Dr. W. B. Hunter, Coushatta, Vice-President; Dr. W. W. Gahagan, Coushatta, Secretary-Treasurer.

The Terrebonne Parish Medical Society has elected the following officers for the coming year: Dr. S. F. Landry, Houma, President; Dr. M. F. Houston, Houma, Vice-President; Dr. H. L. Haydel, Houma, Secretary-Treasurer.

The Webster Parish Medical Society has elected the following officers for the coming year: Dr. Wilkins McDade, Minden, President; Dr. S. M. Richardson, Minden, Vice-President; Dr. B. A. Norman, Minden, Secretary-Treasurer.

Dr. Eugene Lloyd Wenk, Cloutierville, and Miss Cammie Henry, Melrose, were married September 23.

DEATHS

Dr. John Signorelli, New Orleans, aged 49, died December 13.

Dr. John Edgar Rooks, Shreveport, aged 63, died recently from injuries received in an automobile accident.

Dr. Albert S. Yenni, New Orleans, aged 63, died October 1 of carcinoma of the larynx.

MARYLAND

Dr. Raymond Hussey, Baltimore, has been appointed Field Medical Investigator for applicants requesting admission in state sanatoriums from Baltimore.

Dr. Robert A. Hare, Baltimore, and Miss Anne Lee Mead, Berkeley, California, were married in Alexandria, Virginia, on October 23.

DEATHS

Dr. Charles W. Famous, Street, aged 63, died October 17 of coronary thrombosis.

Dr. John William Funck, Baltimore, aged 84, died recently of chronic myocarditis.

MISSISSIPPI

Dr. Chas. D. Mitchell, Jackson, has been elected President of the Southern Psychiatric Association.

Dr. N. C. Knight, Clarksdale, has been made Director of the Lauderdale County Health Department at Meridian.

Dr. Guy Post, Holly Springs, has been made Director of the Coahoma County Health Unit.

Dr. Jesse Hightower, Itta Bena, recently received his appointment as First Lieutenant of the Medical Reserve Corps of the United States Army.

The Coast Counties Medical Society has elected the following officers for the coming year: Dr. F. O. Schmidt, Ocean Springs, President; Dr. A. C. Hewes, Gulfport, Vice-President; Dr. D. L. Hollis, Biloxi, Secretary.

The Issaquena-Sharkey-Warren Counties Medical Society has elected the following officers for the coming year: Dr. Walter E. Johnston, Vicksburg, President; Dr. W. H. Scudder, Mayersville, Dr. Henry B. Goodman, Anguilla, Dr. W. K. Purks, Vicksburg, Vice-Presidents; Dr. Alston Callahan, Vicksburg, Secretary-Treasurer.

The Tri-County Medical Society has elected the following officers for the coming year: Dr. R. S. Savage, Brookhaven, President; Dr. Miller Henry, Georgetown, Dr. J. W. Wilson, Monticella, Dr. J. R. Markette, Brookhaven, Dr. J. J. Pittman, Tylertown, Vice-Presidents; Dr. R. B. Zeller, Hazlehurst, Secretary.

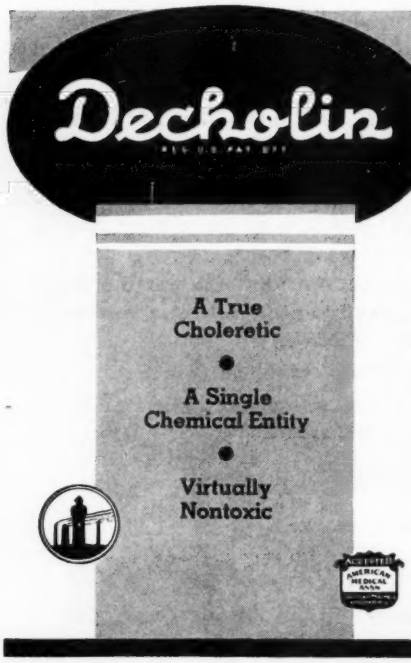
The Mississippi Public Health Association met in Jackson on December 9. Dr. William H. Cleveland, Tupelo, Health Officer of Lee County, was chosen President-Elect; Dr. Francis Michael Smith, Vicksburg, was inducted into the Presidency, and Dr. John A. Milne, Jackson, was reelected Secretary.

DEATHS

Dr. S. L. Brister, Sr., Greenwood, aged 74, died November 10.

Dr. Charles Le Baron, Gulfport, died December 11.

Continued on page 42



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Weigand, F.A.: Diuretic Action of Intravenous Sodium Dehydrocholate, J.A.M.A., 105:2034 (Dec. 21) 1935.

Physicians are invited to send for the second edition of the comprehensive brochure "Biliary Tract Disturbances."

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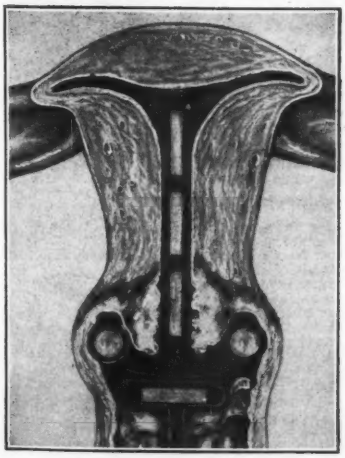

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Continued on page 40

MISSOURI

Dr. Alphonse McMahon, St. Louis, was installed January 3 as President of the St. Louis Medical Society for 1939, having been elected without opposition.

Dr. M. Pinson Neal, Columbia, was inducted into office as President of the Mississippi Valley Medical Society at the annual meeting in November.

Dr. Charles H. Neilson, St. Louis, was appointed to the State Board of Health by the Governor recently.

DEATHS

Dr. John Lee Lantz, Kansas City, aged 74, died October 20 of coronary thrombosis.

Dr. James Anderson Crockett, Stanberry, aged 62, died October 28.

Dr. Isaac N. Rogers, Rogersville, aged 88, died recently of bronchopneumonia.

Dr. Thomas C. Allen, Bernie, aged 65, died November 18 of cardiac hypertrophy.

NORTH CAROLINA

The Buncombe County Medical Society has elected the following officers for the coming year: Dr. W. M. Hollyday, Asheville, President-Elect; Dr. A. B. Craddock, Asheville, Vice-President; Dr. G. W. Kutscher, Jr., Asheville, reelected Secretary.

The Rutherford County Medical Society has elected the following officers for the coming year: Dr. C. H. Whims, Rutherfordton, President; Dr. C. S. Jones, Cliffside, Vice-President; Dr. C. F. Glen, Rutherfordton, Secretary-Treasurer.

The Sampson County Medical Society has elected the following officers for the coming year: Dr. Amos Neal Johnson, Garland, President; Dr. J. S. Ayers, Clinton, Secretary.

The Edgecomb-Nash Medical Association has elected the following officers for the coming year: Dr. M. W. Deloatch, Tarboro, President; Dr. W. C. Noel, First Vice-President; Dr. H. O. Pearson, Pinetops, Second Vice-President; Dr. L. L. Parks, Tarboro, Secretary-Treasurer.

The Iredell-Alexander County Medical Society has elected the following officers for the coming year: Dr. S. A. Rhyne, Statesville, President; Dr. Angus Hinson, Statesville, Vice-President; Dr. F. R. Fleming, Statesville, Secretary.

Dr. George W. Joyner, Durham, has moved to Asheboro to become Resident Surgeon for the Randolph Hospital.

Dr. T. M. Henry, Rockingham, has been made Richmond County Prison Camp Physician.

The Warren County Medical Society has elected the following officers for the coming year: Dr. T. J. Holt, Wise, President; Dr. H. H. Foster, Norlina, Secretary-Treasurer.

The Lee County Medical Society has elected the following officers for the coming year: Dr. A. A. James, Jr., Sanford, President; Dr. Lynn McIver, Sanford, Vice-President; Dr. Waylon Blue, Jonesboro, Secretary-Treasurer.

Dr. J. T. Battle and Dr. Neal Sheffield, both of Greensboro, and Dr. H. L. Brockmann, High Point, were recently reappointed members of the Guilford County Health Department.

Duke Hospital at Durham has announced plans for a new two hundred-room addition to the present hospital building. The new addition will provide for the expansion of the hospital's clinic services, which for the past several years have been taxed to capacity.

Dr. Zack Doxey Owens, Elizabeth City, and Miss Martha Anderson, Houston, Minnesota, were married recently in Baltimore.

Dr. Albert F. Lee, Durham, and Miss Frances Halliday, Seattle, Washington, were married on November 2.

Dr. Lewis William Hagna, Marion, and Mrs. Evelyn M. Innes, Huntington, Pennsylvania, were married recently.

Dr. Glenn S. Edgerton, Hickory, and Miss Sylvia Steele, Statesville, were married recently.

Dr. Amos Gilmore Crumpler, Fuquay Springs, and Miss Dorothy May Raine, Royersford, Pennsylvania, were married recently.

Dr. Duane W. Crankshaw, Hatteras, and Miss Agnes Tolson, Buxton, were married October 12.

Continued on page 44

WHAT!- ONLY 2 OZ. OF NUCOA ALONE SUPPLY ABOUT 15% OF A CHILD'S DAILY VITAMIN A REQUIREMENTS ???
ABSOLUTELY! AS YOU KNOW, CHILDREN REQUIRE 6,000—8000 UNITS A DAY. AND SINCE EVERY POUND OF NUCOA CARRIES AT LEAST 7500 U.S.P UNITS OF VITAMIN A, 2 OZ. OF NUCOA SUPPLY ABOUT 1,000 UNITS-OR ABOUT 15% OF DAILY VITAMIN A REQUIREMENTS[1]
1. Booher, Jrl. Amer. Med. Assoc., Volume 110, P. 1920, 1938.
IN ADDITION, NUCOA PROVIDES APPROXIMATELY 3300 CALORIES PER POUND... AND EXPERIMENTS ON PEOPLE SHOW IT TO BE ABOUT 96% DIGESTIBLE[2]
2. Holmes and Deuel: Am. Jrl. Physiol., Volume 34, Page 479. (Recently confirmed in experiments with New Nucoa by university workers.)
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For Topical Application

Clinical investigations reveal the efficacy and convenience of the topical administration of the potent male sex hormone preparation, testosterone propionate.

Oreton Ointment **is now available for use in those conditions in which moderate doses are required. Good results have been reported in the so-called male climacteric and in certain dermatoses traceable to male sex hormone deficiency. In more severe cases, topical application of the ointment may serve as an adjunct to *Oreton* injections. Supplied in 50 gram tubes, each gram containing 2 mg. of crystalline testosterone propionate.**

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BENIGN PROSTATIC HYPERTROPHY—Relief from urinary symptoms, amelioration of the emotional and mental state.

AGING MEN—Sense of increased well-being and renewed vigor, relief of vasomotor and mental symptoms.

IMPOTENCE and HYPOGONADISM—Increase in size of genitalia, growth of pubic and axillary hair, and increase in number and power of erections.

GYNECOLOGICAL DISORDERS—Relief reported in certain selected cases of menorrhagia and dysmenorrhea.

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Continued from page 42

Dr. Fred G. Woodruff, High Point, and Miss Margaret Lewis Thompson, Winston-Salem, were married recently.

Dr. Frederick Robert Klenner, Winston-Salem, and Miss Annie Hill Sharp, Greensboro, were married October 12.

DEATHS

Dr. A. C. Everett, Rockingham, aged 65, died December 26 from a heart attack.

Dr. Wilbur Ray, Clinton, aged 37, was killed in an automobile accident December 28.

Dr. William A. Trivette, Hamptonville, aged 40, died recently of pneumonia.

Dr. Edward Everard Adams, Murphy, aged 39, died November 10 of pneumonia.

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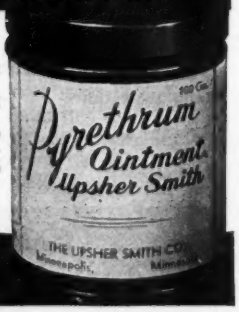

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Dr. Charles Pender Edwards, Asheville, aged 63, died October 6 of cerebral hemorrhage.

Dr. Henry Walter Lilly, Fayetteville, aged 82, died recently of myocarditis.

Dr. Charles Torrence Nesbitt, Wilmington, aged 68, died October 10 of myocarditis.

Dr. Holman Bernard, Pilot Mountain, aged 49, died October 25 of pneumonia.

Dr. James Martin Graham, Asheville, aged 52, died recently of injuries received when he fell from the roof of his home.

Dr. Golston D. Bingham, Sugar Grove, aged 66, died recently of acute dilatation of the heart.

OKLAHOMA

DEATHS

Dr. Edwin A. Boone, Loyal, aged 78, died recently from coronary thrombosis.

Dr. William B. McDaniel, Enid, aged 69, died October 30 of cerebral hemorrhage, hypertension and diabetes mellitus.

SOUTH CAROLINA

The Greenville County Medical Society has elected the following officers for the coming year: Dr. Isaac H. Grimball, Greenville, President; Dr. C. P. Corn, Greenville, Vice-President; Dr. Mordecai Nachman, Greenville, Secretary; Dr. Robert M. Dacus, Jr., Greenville, Treasurer.

The Third District Medical Society has elected the following officers for the coming year: Dr. W. P. Turner, Greenwood, President; Dr. J. E. Brodie, Greenwood, Vice-President; Dr. C. J. Scurry, Greenwood, Secretary.

The Oconee County Medical Society has elected the following officers for the coming year: Dr. T. G. Hall, Westminster, President; Dr. F. T. Simpson, Westminster, Vice-President; Dr. E. A. Hines, Seneca, Secretary-Treasurer.

The Chester County Medical Society has elected the following officers for the coming year: Dr. F. S. Chance, Chester, President; Dr. J. P. Young, Chester, Vice-President; Dr. J. N. Gaston, Jr., Chester, Secretary-Treasurer.

The Anderson County Medical Society has elected the following officers for the coming year: Dr. Herbert H. Harris, Anderson, President; Dr. Ned Camp, Anderson, Vice-President; Dr. Herbert Blake, Anderson, Secretary-Treasurer.

DEATHS

Dr. Andrew Jackson Cauthen, Lancaster, aged 36, was killed recently in an automobile accident.

Dr. John J. Lindsay, Spartanburg, aged 73, died January 5.

TENNESSEE

Dr. W. L. Williamson, Memphis, has been appointed Professor of Gynecology and Head of the Department at the University of Tennessee College of Medicine, succeeding Dr. Wm. T. Black, deceased.

Dr. W. Likely Simpson, Memphis, has been appointed Professor of Otolaryngology and Head of the Department at the University of Tennessee College of Medicine.

Dr. Cecil E. Newell, Chattanooga, has been appointed Chairman of a Committee on Industrial Hygiene of the Tennessee State Medical Association.

Dr. Albert Sullivan, Nashville, has moved his offices from the Medical Arts Building to 2318 West End Avenue.

Dr. Burnett W. Wright, formerly of Los Angeles, has opened offices in the Doctors Building, Nashville, for the practice of urology.

The Davidson County Medical Society has elected the following officers for the coming year: Dr. R. W. Billington, Nashville, President; Dr. George Carpenter, Nashville, Vice-President; Dr. Hamilton Gayden, Nashville, Secretary-Treasurer.

The Five-County Medical Society has elected the following officers for the coming year: Dr. J. H. Tilley, Lawrenceburg, President; Dr. Bartow Williams, Kendricks, Mississippi, Vice-President for Hardin County; Dr. C. C. Stockard, Lawrenceburg, Vice-President for Lawrence County; Dr. W. E. Boyce, Hohenwald, Vice-President for Lewis County; Dr. O. A. Kirk, Linden, Vice-President for Perry County; Dr. F. H. Norman, Waynesboro Vice-President for Wayne County; Dr. O. H. Williams, Savannah, Secretary-Treasurer.

The Smith County Medical Society has elected the following officers for the coming year: Dr. E. D. Gross, Carthage, Presi-

Continued on page 46

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HORLICK'S
the Original Malted Milk

Continued from page 44

dent; Dr. L. D. Sloan, Carthage, Vice-President; Dr. Thayer S. Wilson, Gordonsville, Secretary-Treasurer.

Dr. H. Kermit Brask, Nashville, and Miss Roberta White were married recently.

DEATHS

Dr. Robert Pillow, Columbia, aged 86, died recently of pulmonary edema.

Dr. Marvin A. Nunn, Halls, aged 59, died October 31 of pneumonia.

Dr. Elmer E. Waller, Springcreek, aged 59, died recently of arteriosclerosis, hypertension and myocarditis.

Dr. John Franklin Hunt, Dickson, aged 65, died October 18 of heart disease.

Dr. W. L. Carden, Andersonville, aged 74, died November 4.

Dr. Garrett White, Chapel Hill, aged 73, died November 29.

TEXAS

Dr. Martin L. Fuller, Amarillo, has been appointed City Health Officer.

Dr. George T. Royse, Amarillo, has been appointed County Health Officer of Potter County.

Dr. Henry J. Germany, Waco, was recently appointed City Health Officer.

The Bexar County Medical Society has elected the following officers for the coming year: Dr. L. B. Jackson, San Antonio, President; Dr. E. W. Coyle, San Antonio, Vice-President; Dr. W. W. Bondurant, Jr., San Antonio, Secretary; Dr. J. L. Cochran, San Antonio, Treasurer.

Dr. Maurice Spearman, El Paso, was recently elected Secretary of the Southeastern Society of Eye, Ear, Nose and Throat Specialists.

The Texas Public Health Association has elected the following officers for the coming year: Dr. Walter Kleberg, Galveston, President; Dr. Graham Hatch, Dallas, First Vice-President; Miss Mildred Garrett, Austin, Second Vice-President; Dr. A. B. Yound, Tyler, Third Vice-President; Dr. P. A. Kerby, Austin, Secretary-Treasurer.

The Floydada Hospital, Floydada, owned and operated by Dr. Donald H. Pitts and Dr. A. E. Guthrie, has recently been opened after having been renovated and improved.

The Johnson Hospital, Loraine, owned and operated by Dr. Bruce Johnson, was formally opened November 6.

Dr. John W. Spies, Galveston, has recently been appointed Dean of the University of Texas School of Medicine and Professor of Public Health.

The United States Public Health Service Hospital at Fort Worth was formally opened on October 28 and will be used by the Federal Government for the scientific treatment of drug addicts.

The Texas Radiological Society has elected the following officers for the coming year: Dr. Jerome H. Smith, San Angelo, President; Dr. C. F. Crain, Corpus Christi, President-Elect; Dr. M. H. Glover, Wichita Falls, First Vice-President; Dr. G. D. Carlson, Dallas, Second Vice-President; Dr. Henry C. Harrell, Texarkana, Secretary-Treasurer.

Dr. C. A. Nau, Austin, was recently appointed a member of the Committee on Industrial Health of the State Medical Association.

Dr. W. E. Ryan, Midland, has been doing postgraduate work at Rochester, Minnesota.

Dr. F. M. Wagner, Shiner, has been made a Fellow of the American College of Surgeons.

Dr. E. H. Brock has moved from New Orleans to Houston.

Dr. Haskell D. Hatfield has moved from Ysleta to Baytown.

Dr. A. E. Hill has moved from Tyler to Houston.

Dr. James P. Johnson has moved from Colorado to Grandfalls.

Dr. Amy Jones has moved from Lometa to Dallas.

Dr. E. N. Livingston has moved from Bowie to Terrell.

Dr. Lee Roy Rice has moved from Gainesville to Gonzales.

Dr. Herbert A. Sohm has moved from Houston to Des Moines, Iowa.

Dr. Gayle Spann has moved from Plainview to Freer.

Dr. Hugo J. Strieder has moved from Shiner to Moulton.

Dr. Charles W. Tennison has moved from Dallas to San Antonio.

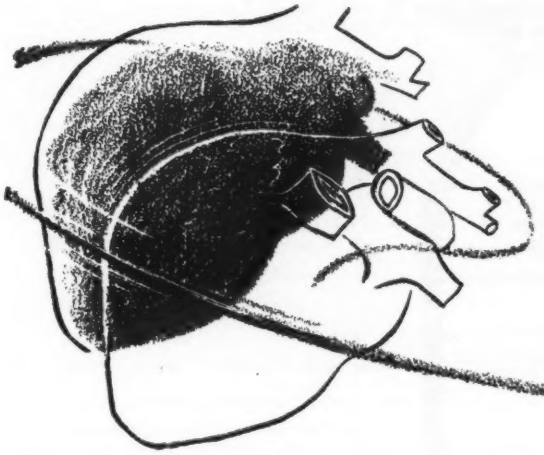
Dr. John B. Bennett has moved from Falfurrias to Lamesa.

Dr. C. L. Jackson has moved from Tulia to Ranger.

Dr. Robert Gordon Carnahan and Miss Sara Elizabeth Alexander, both of San Antonio, were married September 8.

Dr. R. W. Kimbro and Miss Alice Ann Ragsdale, both of Cleburne, were married November 24.

Continued on page 48



The

Heart Takes A Double Beating

The edema associated with cardiovascular disease places a double burden on the already embarrassed heart. Its appearance in the most important portions of the body and impairment of respiration further weakens cardiac function.

T C S

Theobromine Salicylate	Free Fluid Flow
Calcium Salicylate	
Phenobarbital	Better Heart Action
a synergistic combination	

T C S effects comparatively rapid and copious increase in urine output by effective vasodilation, and thru stimulation of renal epithelium. By dilating coronary arteries, it improves blood flow to heart muscles, to promote more efficient myocardial nutrition and activity. Phenobarbital acts as a general sedative and helps reduce the blood pressure where hypertension is an involvement.

The calcium of T C S temporizes the solubility for minimal gastric irritation and speedier utilization. Thus, T C S may be given over an extended period with relative safety.

Take a Load Off The Heart when edema is present—with T C S Tablets. Also indicated to remove excess fluid in edema of chest and abdominal cavity; pain of angina pectoris; myocarditis; dropsy; hypertension; arteriosclerosis with edema. Bottles of 50 and 250 tablets.

Samples gladly furnished to requesting physicians

WILLIAM R. Poythress & CO. INC.
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DIASPORAL
DOAK

"SULFUR-DIASPORAL"

"Original Colloidal Sulfur For Intravenous and Intramuscular Administration".—

"The early administration of Colloidal Sulphur in cases of acute and chronic arthritis is of importance to prevent unnecessary suffering, prolonged invalidism and deformities."
—S. C. Woldenberg, M.D.
Jl. Bone and Joint Surgery, October, 1937.

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COMPANY, INC.
CLEVELAND, OHIO.

The Surgeon—
The Anesthetist—
The Hospital Management—

Will be pleased with the high purity of "PURITAN MAID" CYCLOPROPANE, the excellent results obtained from its use, and the economies effected in the cost of anesthesia. We sincerely urge and invite comparison of our product with any other brand.

A SAFETY FEATURE—

While Cyclopropane itself is a low-pressure gas, it is used often on gas machines opposite high-pressure gas cylinders. The cylinders in which it is marketed, for this and other reasons, should be just as strong as the rest of the system. Don't be misled into the use of cheap light-weight cylinders for this important gas. Consult your insurance engineer and be safe. We use as strong cylinders for Cyclopropane as for any other gas.

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General Offices, Kansas City, Mo.
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Cyclopropane
Nitrous Oxid
Ethylene

PURITAN MAID
TRADE MARK REG.

Oxygen
Carbon Dioxid
Helium

Equipment for the Administration of Helium Gas Mixtures; also Apparatus for the Subcutaneous Injection of Oxygen.

Manufacturers and Distributors—Oxygen Tents, Nasal Catheter Units, Bedside Inhaling Outfits, Anesthetic Gas Machines, Resuscitators and Inhalators, Soda Lime.

Continued from page 46

DEATHS

Dr. Charles Edgar Smith, Mart, aged 60, died October 22 of heart disease.

Dr. Thomas Lester Waggoner, San Angelo, aged 34, died October 30.

Dr. Arthur Shaw McDaniel, San Antonio, aged 82, died recently of chronic myocarditis.

Dr. Charles Henry Christian, Austin, aged 47, died October 3 of uremia, chronic nephritis and myocarditis.

Dr. John Wesley Ellis, Lampasas, aged 61, died recently of arteriosclerosis.

Dr. Otto Carl Ahlers, Sherman, aged 66, died October 30 of cerebral hemorrhage.

Dr. Alexander Stephens Garrett, Weatherford, aged 77, died October 27.

Dr. George McAlpin Liddell, Waco, aged 54, died recently of injuries received in an automobile accident.

Dr. Frank Suggs, San Antonio, aged 63, died recently of coronary occlusion and arteriosclerosis.

Dr. Benjamin Franklin Lyon, Lancaster, aged 73, died recently of bronchopneumonia.

Dr. Robert Blackburn Love, Livingston, aged 63, died recently of ruptured peptic ulcer.

Dr. Elliott Vanveltner Converse, Palestine, aged 59, died October 8.

Dr. Willis A. Clark, Cumby, died recently.

Dr. Alfred A. Chapman, Sweetwater, aged 64, died recently of Hodgkin's disease.

VIRGINIA

The Seaboard Medical Association elected the following officers at the annual meeting in Greenville, North Carolina, December 6-8: Dr. Julian L. Rawls, Norfolk, President; Dr. John L. Rawls, Suffolk, and Dr. Southgate Leigh, Jr., Norfolk, Vice-Presidents; Dr. Clarence Porter Jones, Sr., Newport News, was reelected Secretary.

The James River Medical Society has elected the following officers for the coming year: Dr. J. H. Yeatman, Fork Union, President; Dr. N. P. Snead, Cartersville, Vice-President; Dr. E. J. Haden, Ore Bank, Secretary-Treasurer.

The Lynchburg Academy of Medicine has elected the following officers for the coming year: Dr. S. E. Oglesby, Lynchburg, President; Dr. E. G. Scott, Lynchburg, Vice-President.

The Richmond Academy of Medicine has elected the following officers for the coming year: Dr. Karl S. Blackwell, Richmond, President; Dr. J. Powell Williams and Dr. Harry J. Warthen, Richmond, Vice-Presidents; Dr. James P. Parker, Richmond, Recording Secretary; Dr. Charles Outland, Richmond, Sergeant-at-Arms.

The Arlington County Medical Society has elected the following officers for the coming year: Dr. Alfred M. Palmer, Arlington, President; Dr. Charles C. Canada, East Falls Church, Vice-President; Dr. Henry L. Bastien, Arlington, was reelected Secretary-Treasurer.

The Fredericksburg Medical Association has elected the following officers for the coming year: Dr. J. Minor Holloway, Fredericksburg, President; Dr. L. Philip Cox, Fredericksburg, Vice-President; Dr. Thomas B. Payne, Fredericksburg, was reelected Secretary-Treasurer.

The Southside Virginia Medical Association has elected the following officers for the coming year: Dr. C. S. Dodd, Petersburg, President; Dr. R. S. Montgomery, South Hill, Dr. H. G. Stoneham, Waverly, Dr. L. A. Law, Alberta, Dr. W. T. Gay, Suffolk, Vice-Presidents; Dr. R. L. Raiford, Franklin, was reelected Secretary-Treasurer.

Dr. D. L. Harrell, Jr., Petersburg, has been appointed Superintendent of the State Colony for colored patients.

Dr. John O. Hurt, Staunton, has been appointed principal hospital physician at the State Colony for Epileptics and Feebleminded.

Dr. Louis X. Kolipinski, Petersburg, has been made principal hospital physician at the Central State Hospital.

Dr. Frank A. Dick, Petersburg, has been appointed an assistant physician at Central State Hospital.

Dr. George B. Arnold, Colony, has been appointed a member of Governor Price's Advisory Board on Mental Hygiene.

Dr. William B. McIlwaine, Petersburg, has been appointed a member of the State Board of Medical Examiners.

Dr. William W. Zimmerman, Waynesboro, has moved to Hillsboro, where he will take over the practice of the late Dr. H. H. Green.

Dr. Jean McNutt Martin, Middlebrook, has been appointed Resident Physician at the State Teachers College at Farmville.

Dr. W. R. Bond has moved from Richmond to New York to

Continued on page 50

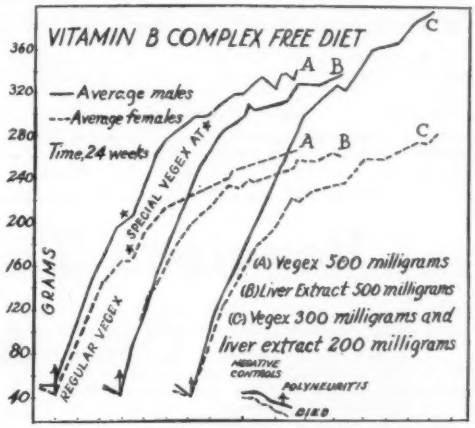
VEGEX
BREWERS YEAST EXTRACT
VITAMIN B COMPLEX
EXTRINSIC FACTOR
MARMITE

VEGEX WITH LIVER EXTRACT

IN 1925, in a patent application, granted in 1930, the Laboratories of the Vitamin Food Company, Prince, recorded the discovery that the vitamins and endocrine extracts, particularly autolyzed yeast extract—Vegex—and liver substance—an extract—mutually supplement each other.

The chart shown here — Albino rat tests — confirms this. Vegex and a standard liver extract show well in the vitamin B complex, with special value when combined. In another series, with another liver extract, the results for eighteen weeks, are comparable to the chart shown here, and showing, further, that there is no appreciable difference between two parts Vegex and one part liver extract compared with one part Vegex and two parts liver extract.

In fifty-seven, independent, published reports from medical centers Vegex is shown high and regularly dependable in the extrinsic factor (anemias). Some of the workers, including Giglioli, Green-Armytage, Vaughan, Wills, Stewart and others, have observed favorable results when combining Vegex and liver extracts.



Green-Armytage (Ind. Med. Gaz., Pernicious Anemia of Pregnancy, March, 1932) states:

> *"We have had excellent results with Vegex-Marmite given in 2 teaspoonful doses twice a day either in cold water or in soup. In a consecutive series of 50 cases I have no hesitation in stating that the clinical and pathological state of the patient greatly benefited as a result of Vegex-Marmite treatment."*

Vegex is a palatable, readily available and easily borne source of the vitamin B complex and the extrinsic factor, and economical for daily use by the patient. It gives a good flavor to liver diet. The value of the oral administration of Vegex, along with the intravenous use of the form of liver extract so used, or with the oral administration of liver extract seem worth while the physician's notice.

Vegex-Vitafood Dried Brewers' Yeast

The current feeding tests of Vegex-Vitafood Dried Brewers' Yeast show it remaining, as always, at the very top in B_1, B_2, G (antipellagric) and the whole of the vitamin B complex. Both the yeast and the Vegex supply the vitamin B complex at a price admitting of enough for the daily use of the child or man patient. There are no other higher sources, at any price, in the whole of the vitamin B complex.

Samples for clinical or professional use will be sent on request

VITAMIN FOOD CO., INC. 122 Hudson Street New York, N. Y. **VEGEX, INC.**

Continued from page 48

become affiliated with the medical research division of the Schering Corporation.

Dr. Ennion Skelton Williams and Miss Ann Hill Brown, both of Richmond, were married December 2.

Dr. Thomas Hamilton Hogshead, Staunton, and Miss Catherine Louise Gierhart, Yonkers, New York, were married recently.

Dr. Frederick Nimrod Thompson, Newport News, and Miss Frances Willett Edwards, Miami, Florida, were married September 29.

Dr. William Frederick Delp and Miss Dorothy Elizabeth Wallner, both of Pulaski, were married November 15.

Deaths

Dr. John Webb Simmons, Martinsville, aged 79, died recently of hypertensive arteriosclerotic heart disease and nephritis.

Dr. William A. Kearney, Prospect, aged 83, died recently of urinary calculi and bronchopneumonia.

Dr. Holland Harvey Green, Hillsboro, aged 38, died recently of coronary thrombosis.

Dr. Thomas D. Tharpe, Portsmouth, aged 72, died recently of coronary thrombosis.

Dr. Lewis Gravely Pedigo, Salem, died November 21.

Dr. Jesse N. Clore, Madison, aged 70, died December 1 of a heart attack.

Dr. John Emmet Early, Charlottesville, aged 70, died December 12.

Dr. Walter Carlton Rosser, Lynchburg, aged 63, died November 24.

Dr. George Oliver Emerson, Danville, aged 66, died November 21.

Dr. James Thomas Strickland, Roanoke, aged 81, died November 25.

Dr. Beverley R. Kennon, Norfolk, aged 67, died December 27 from heart trouble.

WEST VIRGINIA

The Central West Virginia Medical Society has elected the following officers for the coming year: Dr. Eugene S. Brown, Summerville, President; Dr. J. C. Eakle, Sutton, Vice-President; Dr. A. B. Bowyer, Buckhannon, Secretary-Treasurer.

The Eastern Panhandle Medical Society has elected the following officers for the coming year: Dr. M. R. Fox, Charles Town, President; Dr. C. G. Power, Martinsburg, Vice-President; Dr. M. H. Porterfield, Martinsburg, was reelected Secretary-Treasurer.

The Fayette County Medical Society has elected the following officers for the coming year: Dr. C. E. Watkins, Harvey, President; Dr. A. L. Hunter, Pax, and Dr. W. E. Bundy, Minden, Vice-Presidents; Dr. G. A. Daniel, Alloy, Secretary-Treasurer.

The Greenbrier Valley Medical Society has elected the following officers for the coming year: Dr. J. G. Leech, Quinwood, President; Dr. K. J. Hamrick, Marlinton, Vice-President; Dr. R. E. Baer, White Sulphur Springs, was reelected Secretary-Treasurer.

The Harrison County Medical Society has elected the following officers for the coming year: Dr. Jas. G. Ralston, Clarksburg, President; Dr. C. C. Greer, Clarksburg, Vice-President; Dr. M. E. Farrell, Clarksburg, Secretary; Dr. Geo. F. Evans, Clarksburg, Treasurer.

The Kanawha Medical Society has elected the following officers for the coming year: Dr. Thomas G. Reed, Charleston, President; Dr. A. Spates Brady, Jr., Charleston, was reelected Secretary-Treasurer.

The Lewis County Medical Society has elected the following officers for the coming year: Dr. A. F. Lawson, Weston, President; Dr. C. R. Davisson, Weston, Vice-President; Dr. R. O. Pletcher, Jane Lew, Secretary-Treasurer.

The Logan County Medical Society has elected the following officers for the coming year: Dr. J. L. Patterson, Holden, President; Dr. W. H. Parker, Braeholm, Vice-President; Dr. J. W. Carney, Logan, Secretary.

Dr. E. F. Heiskell, Morgantown, was elected President of the Monongalia County Medical Society at its December meeting.

Deaths

Dr. William Lee Miller, Bemis, aged 73, died recently of arteriosclerotic heart disease.

Dr. E. C. McComas, Flat Top, aged 63, died October 18 of acute dilatation of the heart.

Pancreas Therapy
BY
Oral Administration

An aid in the decreased capacity of the patient in states of pancreatic deficiency.

Bottles of 100, 500 and 1000 tablets.
Enterosol coated if desired.

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Newark, New Jersey

Trypsogen

Unless Vitamin-Mineral Intake of Gravida Is Greatly Increased

Every minute, for nine long months, the fetus keeps drawing multiple vitamins and minerals from the gravida. Not just a single vitamin or mineral. That's why so many doctors prescribe Vi-Syneral, the original multiple vitamin-mineral concentrate, prepared under the direction of Dr. Casimir Funk and Dr. H. E. Dubin.

Vi-Syneral furnishes an ample supply of all the definitely recognized vitamins, A, B_1, B_2 (G), C, D, E, including the B Complex, fortified with eight essential minerals . . . so there's no need to worry about the frequent deficiency of these protective food elements in the average pregnancy diet. Vi-Syneral carries the double load most effectively.

Prescribe VI-SYNERAL . . . in Special Potency for Mothers

. . . to help protect your patients against nervous disorders, caries, anemia, general ill health. Four tiny Vi-Syneral* capsules, in the special potency for expectant and nursing mothers, taken once daily—that's all. Specially balanced potencies of Vi-Syneral are also available for other age groups. 1. Adults. 2. Adolescents. 3. Infants and Children. The daily Vi-Syneral ration is equivalent to the vitamin-mineral richness of many pounds of fresh vegetables, milk, fruit and other good foods.

Take the danger of malnourishment out of pregnancy by prescribing corrective diet insurance with Vi-Syneral.

Comprehensive Vitamin Manual and Literature Upon Request.

*Trade Mark Reg. U. S. Pat. Off.

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Please send me a copy of your "Vitamin Manual" and latest literature on Vi-Syneral.

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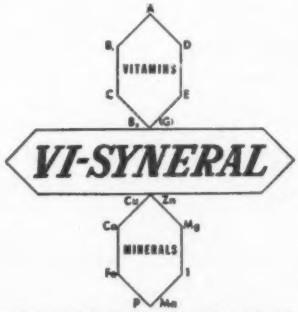

The original scientific formula of Vi-Syneral, pictured above in symbolic form, was developed after 26 years of vitamin-mineral research by Dr. Casimir Funk and Dr. H. E. Dubin.

HIS FIRST CEREAL FEEDING

The baby's first solid food always excites the parents interest. Will he cry? Will he spit it up? Will he try to swallow the spoon? Far more important than the child's "cute" reactions is the fact that figuratively and physiologically this little fellow is just beginning to eat like a man.

PABLUM is now being fed to infants as early as the third or fourth month because it gets the baby accustomed to taking food from a spoon, but, more important, Pablum early adds essential accessory food substances to the diet. Among these are vitamins B_1 and G and calcium and, equally essential, iron. Soon after a child is born its early store of iron rapidly diminishes and, as milk is poor in iron, the loss is not replenished by the usual bottle-formula. Pablum, therefore, fills a long-felt need, for it is so well tolerated that it can be fed even to the three-weeks'-old infant with pyloric stenosis, and yet is richer than fruits, eggs, meats, and vegetables in iron. Even more significant, Pablum has succeeded in raising the hemoglobin of infants in certain cases where an iron-rich vegetable failed. Pablum is an ideal "first solid food." *Mothers appreciate the convenience of Pablum as it needs no cooking. Even a tablespoonful can be prepared simply by adding milk or water of any temperature.*

Pablum consists of wheatmeal (farina), oatmeal, wheat embryo, cornmeal, beef bone, alfalfa leaf, brewers' yeast, sodium chloride, and reduced iron.

Mead Johnson & Company, Evansville, Indiana, U.S.A.

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OLEUM PERCOMORPHUM (Liquid)

10 and 50 cc. brown bottles in light-proof cartons. Not less than 60,000 vitamin A units, 8,500 vitamin D units (U.S.P.) per gram. 100 times cod liver oil* in vitamins A and D.

FOR GREATER ECONOMY, the 50 cc. size of Oleum Percomorphum is now supplied with Mead's patented Vacap-Dropper. It keeps out dust and light, is spill-proof, unbreakable, and delivers a uniform drop. The 10 cc. size of Oleum Percomorphum is still offered with the regulation type dropper.

OLEUM PERCOMORPHUM (Capsules)

Especially convenient when prescribing vitamins A and D for older children and adults. As pregnancy and lactation increase the need for vitamin D but may be accompanied by aversion to large amounts of fats, Mead's Capsules of Oleum Percomorphum offer maximum vitamin content without overtaxing the digestive system. 25 and 100 10-drop soluble gelatin capsules in cardboard box. Not less than 13,300 vitamin A units, 1,850 vitamin D units (U.S.P.) per capsule.

Capsules have a vitamin content greater than minimum requirements for prophylactic use, in order to allow a margin of safety for exceptional cases.

Uses: For the prevention and treatment of rickets, tetany, and selected cases of osteomalacia; to prevent poor dentition due to vitamin D deficiency; for pregnant and lactating women; to aid in the control of calcium-phosphorus metabolism; to promote growth in infants and children; to aid in building general resistance lowered by vitamin A deficiency; for invalids, convalescents, and persons on restricted diets; for the prevention and treatment of vitamin A deficiency states including xerophthalmia; and wherever cod liver oil is indicated.

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We purposefully selected for these products classic names which are unfamiliar to the laity, or at least not easy to popularize. No effort is made by us to "merchandise" them by means of public displays, or over the counter. They are advertised only to the medical profession and are supplied without dosage directions on labels or package inserts. Samples are furnished only upon request of physicians.

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OLEUM PERCOMORPHUM

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One of a series of advertisements prepared and published by PARKE, DAVIS & Co. in behalf of the medical profession. This "See Your Doctor" campaign is running in the *Saturday Evening Post* and other leading magazines.

STORM WARNING FOR FEBRUARY: RISING MERCURY

THE YOUNGSTER in the picture isn't terribly sick.

He has come home from school with signs of nothing more than an ordinary cold. But his mother, sensible woman that she is, packs him off to bed at once.

For she knows that, at this time of year particularly, *any* cold may be the threshold of pneumonia. She knows that February shares with March the dubious honor of being a "pneumonia month;" that, together, they constitute the season of the year when pneumonia is most prevalent and most dangerous.

Throughout the next six or eight weeks especially, it will be wise to take every possible precaution against pneumonia. Get plenty of rest—for pneumonia's greatest ally is fatigue. Avoid any over-exposure, particularly to extreme cold and dampness.

But above all, if anyone in your family has a cold and his or her temperature rises above normal, don't delay! Call your physician at once. Watch out, too, for chills, pain in the side or chest, and a cough. They, also, are danger signals that should be heeded promptly.

If your doctor is called at once, there is less to fear from pneumonia than ever before. Medical science can offer pneumonia patients more help—can bring about more and quicker recoveries—than in any previous "pneumonia season."

But the pneumonia germ works fast, and every hour counts. If your doctor's treatment is to be most effective, he *must* be called early.

•

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SEE YOUR DOCTOR